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# **DEVELOPMENT**

01

# CHRISTIAN ARCHITECTURE

IN ITALY.

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#### **DEVELOPMENT**

OF

# CHRISTIAN ARCHITECTURE

# IN ITALY.

BY

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# DEVELOPMENT

OF

# CHRISTIAN ARCHITECTURE

IN ITALY.

a system of classification, much less one corresponding with a chronological arrangement.

After a time, however, when my note-book became pretty well filled, so as to enable me to make comparisons between the various buildings, I found that their mechanical and decorative peculiarities gradually formed themselves into a morphological order, in which any one phase seemed naturally to grow out of that which preceded; the varieties of Italian Architecture thus appearing to be true developments of the ancient Basilican style. It then only remained to test this arrangement by referring to the actual dates of the erection of the churches themselves, which I obtained either from the local guide-books, or such works as I could lay my hands upon.

The dates of the churches which illustrate the same architectural phase I therefore collected together, and by that means formed periods, which I assigned to each phase; and although in some instances these periods overlap each other, yet they all stand in an order, which agrees with that of the classification.

I considered, therefore, that such a result of my labours, although imperfect, would add to the

science of Architectural Morphology, as it may be termed, and therefore requires no apology for publishing.

In any work on Architecture there is one great difficulty, namely, how to give the reader a correct idea of a building without tiring him with lengthy descriptions, or increasing to too great an extent the expense of the work by a large number of elaborate drawings.

This difficulty has, I hope, to some extent, been overcome from the very mode of viewing architecture which I have adopted.

Having once correctly conceived of the construction, mechanical and decorative, of a set of buildings under a particular phase, since the next phase is but a development of the other, all that has to be attended to is the description of the changes which lead from the first to the second, the original conception in other respects being preserved. At the same time I have added drawings, which will serve to regulate any misconceptions which may arise during the perusal of the treatise. The drawings have in many instances been denuded of the minuter details, which would only tend to draw away the attention

from the mechanical and decorative construction, which it is the particular object of the following treatise to consider. They must, therefore, be looked upon simply as illustrations of the remarks made in the text, and not as complete representations of the buildings drawn to scale.

I have found Dr. Whewell's work, entitled "Architectural Notes on the German Churches," of the greatest assistance, especially as to the suggestions contained in it respecting the taking of architectural notes, the notation of vaulting, and the terminology.

I only regret that I had not had the pleasure of reading Professor Willis's "Remarks on the Architecture of the Middle Ages," before I made my tour. Had I done so, a great amount of labour would have been saved.

I am glad, however, to find since the perusal of his work, that the character of the following treatise is so different, as not in any way to intrench upon that which has been already so ably treated of by him. For, although the view which I have taken of Italian Architecture is, I think, not inconsistent with that held by Professor Willis, it is taken from another point, stress being laid

upon features which do not form the principal subjects of his treatise.

In my travels I most scrupulously examined all the buildings, small as well as great, which I was able to find; and the instances of Italian Architecture which will be brought forward have been, with scarcely an exception, personally inspected, and I have taken both sketches and notes of each one of them on the spot.

In this way I have been led to find buildings which have received no notice at all in other works, and which form a most important place in the exemplification of Architectural Development, discovering to us the origin of some particular features which otherwise would appear to have been introduced independently of all that had gone before. I have thus found also how great a mistake it has been, in treating of Italian Architecture, to confine the attention only to a few noted buildings, which, it will be seen, are sometimes the very worst instances from which to obtain any general ideas of the styles which prevailed.

Whatever may be thought of the theory of Development which I have attempted to establish, it is to be hoped that at least it will form a chain connecting together facts, which, if they had been stated alone, without inferences or comparisons, would have made the work a mere hand-book, dry to most persons, and incapable of giving any distinct notions of the different varieties met with in Italy, whether with reference to the intimate connexion which exists between them, or the progress of Architecture as a whole.

I have preferred throwing the consideration of the Vaulting into an Appendix, since it has been treated of in a way, which, for the most part, cannot be understood without a slight knowledge of mathematics and the methods of generating surfaces. Also, throughout, it requires rather more close attention than is necessary in the body of the work, and is of the nature of a distinct treatise upon the forms of vaulting and theoretical methods of constructing vaults.

#### DEVELOPMENT

OF

#### CHRISTIAN ARCHITECTURE IN ITALY.

#### INTRODUCTION.

BEFORE entering upon the subject of the Development of Christian Architecture in Italy in a detailed manner, it will, perhaps, be useful, in the first place, to take a cursory glance at the Ecclesiastical architecture of that country, in order that the reader may be made acquainted with the view which the writer takes of it.

No one who has passed through the principal cities of Italy, and visited the numerous churches they contain, can fail to have been struck by the great variety of styles he has met with. He will have noticed that, although the greater part of the churches nearly in every city has been erected within the last four centuries, and a part during an earlier period, but now masked with later work,

there yet remains a goodly number standing at present either as they were originally built, or partially altered, but in each case belonging to times included between the fourth and fifteenth century.

It is proposed, in this treatise, to consider Ecclesiastical architecture between these limits, so as to take in all churches not belonging to the Renaissance and succeeding styles.

The Renaissance appeared before the end of the fifteenth century, but did not immediately displace the previous style, showing itself at first chiefly in the overlaying existing churches with sculptures and ornaments nearly allied to those of the Classical period.

The architecture of the last four centuries is not considered in this work, and that simply because it would form too large an addition, not because of any great dissimilarity between it and the style immediately preceding; for it might be shown that the change which took place in the fifteenth century consisted rather in the revival of Classical decorations, than in the re-adoption of the Classical principle of construction in place of the principle of Gothic architecture.

But it will be necessary to explain what is meant by the principles of Classic and Gothic architecture respectively.

If we turn to page xiv of the preface to the new edition of Dr. Whewell's "Architectural Notes on the German Churches," we shall find five statements which express the most important differences between the two rival styles. would seem as if those parts of these statements which refer to Gothic architecture are all included in one of the fundamental maxims given by Mr. Rickman. In other words, we may consider the five statements of Dr. Whewell to be the most important manifestations of the fundamental principle of Gothic architecture, which may be expressed as follows: "That every artifice of construction must be displayed." The first of Dr. Whewell's statements is, "The arch is essential, the entablature is not; and the columns support arches instead of entablatures." Now it will be seen in the sequel that the arch was used mechanically in the same construction in which the entablature appears decoratively, and that the first step in the development of Christian architecture was the revealing this concealed arch, and

destroying the entablature which had no office in the display of the construction. The fourth statement we will give next, though without comment, as it is clearly in its very terms a manifestation of the above principle. It runs thus: "The diagonal pressures of the arch are displayed, whence we have buttresses and pinnacles."

The third is, "The weights are divided into as many parts as possible, and these are given to independent props; whence we have, among other results, clustered piers or pillars."

It will be seen that transverse and diagonal arches were used in the construction of the vaulting, the vaulting actually resting upon these arches. The latter are, therefore, a part of the mechanical construction, and are so framed as also to be of use decoratively. Now, the more the individuality of these arches is preserved, the more the artifices of the construction of the vault are displayed; hence the introduction of independent props, or the giving to each arch a shaft for its support, which forms an inferior member of a compound pier.

The fifth statement runs thus: "Generally, the running and dominant lines are vertical in

this style, as they were horizontal in the ancient styles." It will appear that this follows immediately from the third statement; for, in introducing the vertical members spoken of there, they will necessarily come into collision with the horizontal members, such as the cornices, string-courses, &c., so generally used in the older buildings.

Now, according to the fundamental principle, as architecture developed, all members having no office in showing the construction should make way for those possessing that function. Hence we find that the vertical members, at first broken by the horizontal, soon destroy the continuity of the latter, becoming ultimately themselves continuous, and causing the horizontal members to disappear altogether.

We have yet one more statement to notice, namely, the second, which is, "There are any number of planes of decoration one behind the other: when we have in this way several arches under one, we are led, as Mr. Willis has shown, to tracery; when we have arches of different forms one under another, we are led to foliation."

The vaulting, it was said, was constructed upon

a skeleton of arches, transverse and diagonal, we should add also longitudinal, each in the more perfect examples with definite props. Now these longitudinal arches, together with the pier-arches, form two planes of decoration; the second statement, therefore, may be included in the third so far as this, that the features alluded to in the second would naturally be evolved as the third came into operation. Whichever of these two statements be made the antecedent or consequent, it is clear that they are inseparable from one another; so that the operation of the one involves that of the Hence, even though the second came into operation first, which possibly may have been the case, we may consider it as a manifestation of the third by anticipation, and therefore of the fundamental principle also.

Many other manifestations of the same principle might be shown; for it seems probable that the multiplication of parts, whether they be planes of decoration, or supports, was effected with some reference to lines of pressure depending upon the construction of the building; as, for example, the panelling and piercing of planes to give lightness where the apparent or real stability of the building required it; and the divisions of the piers and other supports according to the positions of the weights they bear.

From all this we may conclude that the fundamental principle which operated in the development of Christian architecture is, "That every artifice of construction must be displayed," as manifested principally in the five different ways stated by Dr. Whewell. And further, since the parts that relate to Classical architecture in these statements are antitheses of those applying to Gothic, we may consider them to be manifestations of an antagonistic principle, "That every artifice of construction must be concealed," which may be called the fundamental principle of Classical architecture.

But to return to the period we propose to consider; its architecture commenced at a time when the action of the Classical principle was already impaired by the introduction of the Gothic principle; and passes throughout the whole period from the Classic towards the Gothic style by a series of continuously progressive changes. We may call the architecture of the first two-thirds of the period, Romanesque, and that of the remaining one-third,

Gothic, in a partial sense, as it would seem to have in these divisions more of the Classical-Roman and Gothic elements respectively.

The term Gothic in its full sense cannot strictly be applied even to the latest buildings of the period we are considering, if we are to understand that it can only be used of architecture in which the above fundamental principle has manifested itself completely. We might, therefore, make use of the word Gothesque, in speaking of architecture which approximates to the Gothic, just as we have called that Romanesque which partakes more of the nature of the Classical-Roman from which it proceeded. Such a term, however, would only be necessary could we find an architecture in which the principle of Gothic appears without any admixture of the Classical.

It would be out of place, as Italian architecture is our present subject, to enter upon a discussion of that of other countries; but it would appear as if all architecture fell short of that ideal point where the Gothic principle may be supposed to be rigorously carried out, the Classical element still lingering even in the most perfect example we can find.

If this be admitted, there can be no ambiguity in applying the term Gothic to that which is Gothic only in a partial sense. But the word Gothic is objectionable, not simply on account of its practical application being to that which has a Gothic tendency only, but also because it would seem to imply that the nearest approximation to this style was attained out of This may have been the case in respect of some of the manifestations of its fundamental principle, but it will be seen, as we proceed, in the later Italian interiors the fifth manifestation, "That the running and dominant lines are vertical in the Gothic, as they were horizontal in the Ancient style,"-which, according to Dr. Whewell, is of a more wide and general nature than the others,-has been carried out to an extent perhaps hardly to be found north of In the latest Italian examples, for the Alps. instance, all trace of horizontal lines is gone, the vaulting shafts rising unbroken to the spring of the vault, and even the ridge-line of the vaulting has lost its horizontal character by the domicalness of the vault. On the other hand, if we consider the architecture of England and France,

we shall find in general, even in the latest examples, the pier-arch story, triforium, and clerestory in their integrity, each being divided from the other by a horizontal string-course, which, it is true, makes way for the vaulting shafts, but in many instances in such a manner, that the vaulting shafts are broken by the passage of the string-courses over them; also the horizontal character of the ridge-line of the vaulting remains.

The churches which arose in Rome in the beginning of the fourth century out of the ruins of the heathen Basilicas and Temples, were in a style which was the root of all the succeeding styles of Ecclesiastical architecture in Italy, if not throughout the world. This architecture in its earliest phase was almost entirely confined to Rome; in its second phase, at the beginning of the fifth century, it spread to Ravenna in particular, though to many other places as well. Some parts of the country, however, received their first Christian architecture probably somewhat later still. Architecture having thus penetrated to all parts of the country, developed in different places in ways sufficiently distinct to form local varieties,

but every where in one direction, namely, towards the Gothic, yet with different degrees of rapidity, so as to arrive at distinct varieties not at one time, but generally at different epochs. The local varieties, whether during formation, or after completion, influenced each other by means of the intercourse which subsisted between places, and by the not uncommon practice of employing architects from a distance, as well as by the spreading of religious orders, which adopted sometimes varieties peculiar to themselves, or to the town in which they had their origin.

It would be an interesting and profitable occupation to point out the characteristics of these varieties, and the influence they exerted mutually; but as the object of this work is rather to consider the progress of architecture as a whole during the interchange of the two antagonistic principles of construction, in which investigation these varieties will to some extent be recognized, we need only mention a few in this place, at the same time suggesting the names by which they may be distinguished.

The earliest Romanesque, which arose at the beginning of the fourth century, might be termed

the Basilican variety, both on account of its similarity to the style of the heathen Basilicas, and because the churches were then built chiefly out of the ruins of these Basilicas.

It will be seen that this architecture underwent an important change about the beginning of the fifth century, when numerous churches were built at Ravenna; it might therefore be distinguished at this time as Ravenna-Romanesque, although not found exclusively there, and probably originating in Rome. A variety arose in Pisa and its neighbourhood about the tenth century, peculiar rather in its external decorations than in any important change in its interior arrangements, which we can call Pisa-Romanesque.

About the eighth century a variety arose also at Pavia, which may be termed Pavian; and nearly at the same time another variety appeared, probably first at Monza, which may be called Monza-Romanesque.

Of the Gothic, we find at Venice two kinds, developments of the Ravenna and Monza-Romanesque respectively. Also at Pavia a Gothic variety sprang out of the Pavia-Romanesque.

The names given to most of the varieties have

been chosen from the town in and around which they seem first to have arisen, or in which there are churches of the kind forming a marked group.

Many others might be pointed out; we will, however, conclude the local varieties by just mentioning a group of churches of peculiar construction placed at Gubbio, a group of similar churches existing in and around Bergamo, and, it would seem, no where else.

The early Basilican style of Rome found its way to the East, and not improbably was the germ from which the Byzantine sprang; the latter in return affected greatly the style which arose on the east coast of Italy. Indeed, Christian architecture throughout Europe might perhaps be traced to the Basilican style of Rome, developing in each country into local varieties, in a manner similar to that which has just been asserted of architecture in Italy; and the styles of Italy itself were influenced by these foreign varieties. We may, for example, point out the influence of Norman and French Gothic on the architecture in and around Naples; that of Spanish architecture may perhaps be traced on

the south-west coast; and, lastly, that of German Gothic in Northern and Central Italy.

The influence of the local Italian varieties also on particular buildings may be recognized. Take, for instance, the church of S. Antonio, at Padua, in which we find the vaulting and domes of the Byzantine, which was naturalized at Venice, the coro and nave being respectively Venetian and Pavian Gothic, while the façade is Pisan, and in arrangement very like that of S. Paolo, at Pistoia. In the façade of the Duomo, at Ferrara, also, we may discern a Pisan, a Pavian, and, perhaps, also a Byzantine influence. And so with many other churches, as will occur to those who have made Italian architecture a matter of personal observation.

It would be tedious to point out the peculiarities by which these varieties may be distinguished; but we shall be able, to some extent, to trace them as we proceed. It will be sufficient here to say that they are found in the details, in the ground plans, in the selection of the form of the piers, or in the combinations of them, &c., but not in any divergence from the common path towards the Gothic, in which

direction they all progress with greater or less velocity.

The most conspicuous of the manifestations of this progress towards the Gothic will be traced in the succeeding chapters, particular stress being laid upon the relative prominence of those vertical and horizontal members, which fulfil important functions either in the mechanical or decorative construction. And we shall find that the horizontal members diminished, and the vertical members increased, relatively, and, for the most part, even absolutely in prominence as architecture developed.

This prominence depends partly upon the strength and number of the members, and upon the simple or compound nature of the members themselves, but chiefly upon their continuity. For as a vertical member comes into collision with a horizontal member, one must be either broken to allow the passage of the other, or must alter its form so as to pass round it, or both may alter their forms at the point of passage.

When a member is compounded of a number of inferior members, each of the latter may be treated in one of these ways. Thus in theory

there are a vast number of changes which would form steps in this particular manifestation of the development of architecture. In the sequel examples will be given illustrating many of these steps, and, in so doing, we shall find that the churches of Italy will arrange themselves in an order, in the main consistent with one formed chronologically; that is to say, we shall find the churches will place themselves in groups, which contain all those whose architecture is in the same stage of development, and the relative position of the groups will be chronologically The period assigned to each group, however, can be stated only approximately as to its limits, and will, in most cases, be that in which the particular phase of architecture assigned to it chiefly prevailed.

In some cases the periods have been extended, in order to include as many examples as possible of the same style, whose dates are ordinarily placed beyond the limits determined as above. These periods may possibly be reduced when a more careful investigation of the history of these churches has been made; but even should this be done, we shall probably still find some of

these churches to be of later date than any comprised within the periods during which the several phases chiefly prevailed; since some churches may perhaps be copies of preceding works, while others may have been erected many years after they were planned. Then, again, the development of architecture was not uniformly progressive in all places; so that we may easily suppose it to have passed here and there into a particular phase somewhat before this phase became general, and in some places to have attained it afterwards.

Another thing must be taken likewise into account when we come to deal with examples, and attempt to assign to them their proper places in the order of time; and that is, the frequent practice in Italy of altering churches by the addition of new members, the older ones remaining intact, or being changed only so far as the positions of the new ones required it. Where this has been done, we find in the new members that the ornamental detail has in many instances a great resemblance to that of the older, so that they are not always recognized with ease; and there is, moreover, a difficulty in ascertaining with certainty how far the older members may have

suffered alterations. By comparing, however, the mechanical and decorative construction of the new members with those of other churches, we may discover to what age they belong, taking into consideration also the object of their introduction, such as, for example, additional strength, or the replacing a wooden roof by vaulting, &c. be understood that a church altered in the above way does not present to us a cluster of parts, each a perfect specimen of the style of its epoch, as we see in so many English examples, but a whole resulting from a mixture of styles engrafted Such a result frequently one upon the other. became the point of departure of a local style based upon it, and in some instances it influenced generally the development of architecture.

When the additions and alterations are of a time later than the fifteenth century they can easily be distinguished, since the ornamental detail differs widely from the older; and, in many cases, they are so exclusively ornamental, as to leave the construction of the original building in its integrity.

In the ensuing chapters, the interiors, façades, and towers are treated separately, as the mechanical and decorative construction of the principal members in each are different. A separate treatise on vaulting has been appended, the construction of the vaulting being, in many cases, so curious and ingenious, as to require a more systematic investigation than is necessary in respect of the other parts.

# PART I.

## INTERIORS.

## CHAPTER I.

### BASILICAN CHURCHES.

WE shall commence by considering the churches and baptisteries in Rome, which arose out of the ruins of the heathen Basilicas and Temples.

Most of the churches are in arrangement similar to the Basilicas, having in general three, though in some cases five aisles, separated by rows of columns supporting entablatures, with the addition of frieze and cornice.

The central aisle, and sometimes each of the lateral ones, terminates in a semi-domical apse, or enters a transept of rectangular plan, to one of whose sides the apse or apses are attached, opposite to the entrances of the aisles into it. The columns were taken from the ruins of the

Classical buildings, and arranged with little regard to uniformity; for we find some of different orders, diameters, and even altitudes standing in the same row.

The architraves also were constructed of fragments whose ornamentation shows that they were never meant to be placed side by side.

We can have no doubt that the buildings in which these irregularities exist were erected by Christian architects, and were not, as some have supposed, Classical buildings adapted to Christian uses.

Of the churches following the Basilican arrangement all possess some of these irregularities, except S. M. Maggiore, in which the columns are perfectly uniform.

Similar irregularities are found in the circular and octagonal churches, with the exception of S. M. ad Martyres, and S. Bernardo de' Termini, well known to be of Classical times: to these we may perhaps add the church of S. Teodoro.

SS. Cosimo e Damiano has also parts of Classical construction; and the church of S. M. degli Angeli needs no mention, as having been the great hall of the baths of Diocletian.

In the Basilican churches, with two exceptions, a lofty brick wall rises upon the entablature, as in fig. 1 of Plate I., pierced with round-headed windows, placed horizontally, and generally so that the spaces between are about equal to the breadth of a window. The weight of this wall would have been too great for the entablature supported only by columns placed under the joints; arches of small curvature were therefore built upon the entablature, so as to throw the weight of the wall directly upon the columns.

Now, if we take away the entablature, and insert blocks of marble between the capitals of the columns and the spring of the arches, so as to restore to them their function of supporting the fabric, we shall obtain a row of columns, upon which rest visibly arches of small curvature, the mechanical construction thus becoming of use decoratively. This arrangement may be seen in the Duomo, at Narni, and has been drawn in fig. 2 of Plate I. We see here, then, the first step in architecture as it developed under the guidance of the fundamental principle, "That every artifice of the construction must be displayed."

The side aisles of the earliest churches were

covered by wooden roofs, until Roman vaulting, such as we see on a large scale in the baths of Diocletian, was brought into use. In constructing this vaulting, the transverse semi-cylinders were made to rest on the columns, so that the partition wall became in part built on semi-circular arches, as well as on those of small curvature spoken of above, see fig. 5, Plate VI. This method of building the partition wall may be observed very well in the nave of S. Lorenzo fuori le mura, Rome, where the falling away of the plaster has revealed the construction, which in most cases is concealed.

The next step in the development of architecture was to do away with the arch of small curvature, allowing the wall to be built entirely upon the semi-circular arch on which the vaulting rests. Now, by clearing away the entablature as before, and inserting blocks of marble, there will remain a row of columns supporting semi-circular arches, as in fig. 3, Plate I. This is the second and most important step in the displaying of the mechanical construction, and giving to it a decorative use, while, at the same time, it destroys the continuous horizontal entablature, which is a member purely decorative, and not at all necessary

mechanically. For a long time, however, a cornice was introduced above the arches, which did not entirely disappear until it was compelled to do so by the prolongation of the vertical members, as will be seen in the sequel.

After a time the ancient Classical columns became scarce, making it necessary for the builders to use in combination fragments so incongruous, that, amongst other irregularities, we find columns placed in the same row, having different altitudes. This difference was made up for by inserting larger and smaller blocks of marble between the capitals of the columns, and the spring of the The mode of compensating for this irregularity may be seen in many churches, but particularly well in S. Saba, a part of which has been drawn in fig. 3, Plate VI. In some cases the blocks are so chosen, that they give to the arches the effect of being stilted. We need hardly be reminded how common a form the stilted arch was in later architecture, where it was used decoratively, and not, as in these churches, on account of the exigences arising from the custom of building with old materials.

The central aisle of the Basilican churches is,

in general, exceedingly broad compared with the thickness of the partition walls, which are necessarily about the breadth of a column; it was therefore impossible to use vaulting, as in the side aisles, without quite altering the construction of these walls; hence the wooden roof was retained in it. for a considerable time after the side aisles had become vaulted. A similar roof to that of the central aisle was placed also over the transept. Now at the entrance of the nave into the transept, the roof of the former would have partly to support that of the latter, an additional weight which it could scarcely bear: an arch, therefore, was thrown over the nave, forming the entrance to the transept, on which the roof of the transept rested, while, at the same time, it gave additional support to that of the nave. This arch springs either from rectangular blocks, set against the walls of the nave, or from two columns, just detached from the walls. Similar arches of smaller size form the entrances of the side aisles into the transept, while the last arch of each longitudinal series, or in the earlier churches the entablature, is supported on a rectangular block, placed in contact with the isolated mass, which becomes a

compound pier of one of the forms represented in figs. 1 and 2 of Plate VII. The whole of this arrangement may be seen in fig. 1, Plate VI.

Opposite to the great transverse arch the principal apse is placed, and in the case of S. Giovanni in Laterano, where the wall rises considerably above the apse, an arch of like dimensions with the transverse arch is built into it, relieving the apse from part of its weight, and suggesting to us the treatment of "the crossing," so common in later times. A still nearer approach to this treatment is to be seen in S. Anastasia, where the apse itself is entered by an arch, supported on detached columns, just as that by which the nave enters the transept. This arrangement has been drawn in fig. 1, Plate VI. In S. Anastasia there are also arches spanning the transept, so as to form "a crossing," in every respect similar to that occurring in later architecture; but these may possibly have been additions to the original church, which suffered considerably from restorations during the prevalence of the modern Italian style.

In S. Giovanni we find "an ambulatory," that is, a continuation of the inner side aisles by

means of an aisle passing round the back of the great apse; this is entered from the transept by arches placed opposite to those by which the side aisles communicate with the transept. The object of this ambulatory seems to have been, to make all parts of the church accessible without crossing in front of the High Altar. It has no communication with the apse, as is the case with the "chevet" of Gothic churches, but it may well be considered as the origin of the latter.

The apses of these churches are all nearly semicircular in plan, and are covered by semi-domes frequently lined with mosaic; in that of SS. Nereo ed Achilleo, the semi-dome springs from a massive cornice made up of rectilinear Classical fragments, parts of some ancient architraves; this cornice gives to the apse somewhat the character of a polygonal one. Now the polygonal apse will be found of common occurrence in the later churches, particularly those of the Gothic period; indeed it was ultimately adopted quite to the exclusion of the semi-circular form.

The apse of S. M. in Navicella is remarkable also, and in this respect, that from the spring of the semi-dome nearly to the ground, the angles

made by the apse and the wall out of which it is, so to say, excavated, are cut out, leaving rectangular recesses, in which are placed ancient columns, see fig. 2, Plate VI. Here we see the "nook" and "nook-shafts" afterwards so frequently introduced in compound piers.

We have, before concluding this chapter, yet to notice two churches, namely, S. Lorenzo fuori le mura, and S. Agnese also without the walls. first is drawn in fig. 1, and the last is fig. 2 of These, it will be seen, differ from all Plate IV. the preceding churches, by reason of the galleries which are placed above the side aisles. arrangement is of Classical origin, for it existed in some of the ancient Basilicas. But in the latter, the columns supported visibly entablatures, as in the lower colonnade of S. Lorenzo. In S. Agnese, the double colonnade extends round three sides of • the church, the apse being attached to the fourth The same arrangement is found also in S. Lorenzo, except that the apse has been destroyed in order to make way for a spacious nave.

We may notice that we have in these churches the "clerestory," "triforium," and "pier-arch story" all complete, the triforium not having as yet become a merely ornamental member of the building, as we find it in Gothic times.

The following is a list of Churches in Rome and elsewhere, the most important features of which we have been describing, those at least which have the greatest bearing upon the general development of Christian architecture.

# Rome,

- S. M. Maggiore,
- S. Prassede,
- S. Lorenzo fuori le mura (nave),
- S. M. in Trastevere,
- 8. Crysogono,
- 8. Martino al monti,
- S. Bibiana,
- 8. Croce, originally.

In all these the columns support entablatures.

In the old St. Peter's, the central aisle was separated from the inner side aisles by columns supporting entablatures. But the inner and outer side aisles were divided by columns supporting arches. Out of Rome we find two churches having parts in which there are columns supporting entablatures, namely, S. M. di Castello near Bergamo, and the Duomo at Murano, near Venice.

We have also in Rome,

S. Paolo fuori le mura,

S. M. in Ara Coeli,

88. Quattro Incoronati, S. Gio in Laterano, originally.

S. Bartolommeo all' isola,

S. Sabina.

S. M. in Via lata,

88. Nereo ed Achilleo,

8. Prisca,

S. Saba,

8. Giorgio in Velabro,

8. Pietro in Vinculi,

8. Nicolo in Carcere,

8. M. in Navicella,

S. Anastasia.

In all these the columns support arches. These churches also have transepts.

> In all these the columns support arches. These churches have no transepts.

Besides these, there are S. Clemente and S. M. in Cosmedin, which differ from the rest, and will be noticed afterwards. Some, also, there are in addition to these, but so modernized as hardly to require mention.

In other parts of Italy we have:-

S. Francesco,

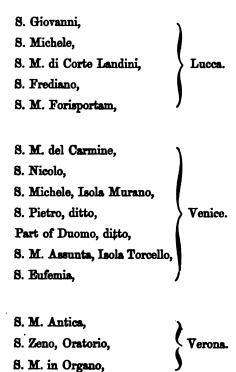
S. Apollinare,

S. Agata,

S. Apollinare in classe,

S. Teodoro,

Ravenna.



In all these the columns support arches semicircular, or nearly so.

Also there are in other cities, S. Frediano, and in part the Duomo, at Pisa; S. Donato, Genoa; the Duomo, at Pietra Santa; the Duomo, and S. Bartolommeo, Pistoia; S. Pietro, Perugia; S. Gietano, Napoli; the Duomo, and S. Sisto, Viterbo; S. Alessandro, Fiesole; S. Maria, Toscanella; part of S. Andrea, Orvieto; S. Sepolcro,

Milano, and possibly many others. These, however, will be sufficient to show how very generally the Basilican-Romanesque was spread throughout Italy, particularly during its second phase, when the columns were made to support, decoratively as well as mechanically, round-headed arches, and which in the Introduction was distinguished as Ravenna-Romanesque.

In all these churches most of the columns are truly Classical fragments, and the remainder are rude imitations retaining very nearly the Classical proportions, and with capitals also following in general outline those of some one of the Classical orders. We must not, therefore, confound these columns with the massive cylindrical piers of which we shall speak hereafter.

And now, before we proceed further with the Basilican churches, we must turn our attention to those round, square, and polygonal churches or baptisteries, which were cotemporary with them. For, on account of their peculiar forms, in which they followed some of the heathen Temples, the changes which took place in their construction, as they developed, were somewhat different from those we have just been con-

sidering; or, rather, there were additional changes, and these are of great importance in our investigations on account of the influence they exerted on the future progress of the Basilican churches.

### CHAPTER II.

ROUND, POLYGONAL, AND SQUARE CHURCHES.

WE shall find that the round, polygonal, and square churches have many points in their internal arrangement in common with the Basilican churches. We will begin with S. Stefano Rotondo, Rome, in which there is a central part separated from a surrounding aisle by a colonnade supporting an entablature. Above the entablature a brick wall rises, pierced with windows in a manner quite similar to that of the partition walls in the Basilican churches.

The entablature is curvilinear, rudely constructed of travertino; this, together with the irregularity of the columns, shows that the origin of this church is not classical, as some have supposed.

The central part is so large compared with the thickness of the partition wall, which rests on

diametrically placed wall, which is built upon three arches resting on four columns of large dimensions.

S. Giovanni in fonte, Rome, is another church in which we find the columns supporting an entablature. Here we have two colonnades one above the other. The form of this church is octagonal, eight ancient columns supporting eight pieces of classical architrave, upon which eight columns of smaller dimensions rest, on whose entablature is placed an octagonal dome, which in this case is easily constructed, since the radius of the central part is small compared with the thickness of the columns.

In the following churches the columns support arches instead of entablatures. The first we shall notice is the baptistery at Asti, where there is no gallery, but simply an arcade of round-headed arches resting on columns which separate the aisle from the central part. Similar in arrangement to this, is the church of S. Tomaso in limine, near Bergamo, only that here we have the addition of an upper arcade communicating with a gallery.

In both these churches, the small dimensions of the central part admit of a dome, whose support is further strengthened by the transverse arches thrown across the aisle, and in S. Tomaso, the gallery also.

S. Angelo, Perugia, is a church arranged, as regards the partition wall, like the baptistery at Asti, but, on account of its large dimensions, the central part is not covered by a dome, but by a wooden roof.

The manner in which this roof is supported must be particularly noticed, since we find it afterwards adapted to the support of the roofs of the Basilican churches. It is as follows:—four arches placed diametrically spring from alternate columns, their lateral thrust being counteracted by semi-arches, or, as we may call them, flying buttresses, crossing the aisle opposite to every column. This arrangement is much more elegant than that adopted in S. Stefano Rotondo, and may be seen in fig. 1, Plate V.

Domes were not, however, confined to churches of small dimensions, for we find two cases in which the central part, although of large radius, supports a dome. In these cases the requisite strength is obtained by doubling the thickness of the partition wall. This produces a change in the colonnade below, the arches resting on coupled columns, each of a pair standing on the same radius. S. Costanza, Rome, and S. M. Maggiore, Nocera, are examples of this. A part of the latter is drawn in fig. 4, Plate V. In both these cases the dome is strengthened by the vaulting of the side aisles, and in S. Maria, by the introduction of transverse arches as well.

Before considering those churches in which there is no properly surrounding aisle, we will describe, on account of its unique form, the square church standing close by the Duomo at S. Germano, Regno di Napoli. It has its central part separated from the aisle by twelve columns supporting equal round-headed arches, three to each side of the square.

Two arches spring also from each corner column across the aisle in the directions of the sides of the square. The eight compartments of the aisle so formed are covered by wooden roofs, the four corner ones being very much loftier than those intermediate, and nearly equal in height to the central part, which is covered by a

wooden pyramid. The five lofty compartments affect the external appearance, and no doubt gave the church its present name of S. Maria degli cinque torre.

When there is no surrounding aisle, the dome can be supported, whatever be the internal arrangement, since it will rest on the external wall alone. In the octagonal baptistery at Novara, for instance, the dome is supported on the external wall, and, in a decorative sense, upon eight columns placed in its angles. These columns also support the arches by which the wall is pierced, and which communicate alternately with semicircular apses and quadrilateral chapels.

The baptistery at Ravenna also has no aisle, and its internal arrangement is worthy of particular notice, as we find in it a feature copied afterwards in the triforia of the Basilican churches. One side is drawn in fig. 6, Plate V. The feature alluded to is the arched panel, including three arched openings separated by detached columns. This may be considered as one of the first instances of decoration in different planes, which manifestly leads to the formation of tracery.

We have paid particular attention to the domes

in the round and octagonal churches just described, partly because of the effect they had on the general internal arrangement, but chiefly because they seem to have suggested the subsequent practice of covering "the crossing" in the Basilican churches with domes. Indeed, the round churches, and still more some of the square churches we are about to consider, have no slight resemblance to that part of the Basilican churches in the neighbourhood of the crossing. They have, in fact, a cruciform element in their construction.

S. Costanza, for example, which was described above, has four out of the twelve arches which support the partition wall larger than the remaining eight, which are placed in pairs between them; and opposite to the greater arches quadrilateral chapels or apses are attached to the outer wall.

In the square churches the cruciform element is still more apparent; the arms of the cross are more extended, each presenting to us the commencement of three aisles. S. Fosca, Isola Torcello, near Venice, is an example of which there is a drawing in fig. 2, Plate V. Three

sides of the compartment under the dome are the same in arrangement as that represented in the figure referred to above; in the fourth, the rudimentary three aisles extend one more bay, and the central aisle finishes in a semicircular In this case it is to be noticed that the diameter of the dome is equal to the breadth of the three aisles. In S. Satiro, Milan, see fig. 3, Plate V., the diameter of the dome is equal to the breadth of the central aisle only, so that this church completely represents to us the mode covering "the crossing" of the Basilican churches with domes, at least the one generally adopted, though some follow an arrangement based upon that of S. Fosca.

In the Plate just mentioned we see that the dome of S. Satiro is octagonal in form, while that of S. Fosca is hemispherical, or would be so if entirely completed. We find also the church of S. Jacobo, ponte Rialto, Venice, having an arrangement very similar to S. Satiro, and having, like S. Fosca, a hemispherical dome. Now, S. Jacobo is a church of very early date, having been erected A.D. 421. And S. Satiro also dates from A.D. 869. We may, therefore, consider the first as

a type of the arrangement of "the crossings" in churches in and around Venice, where the domes are generally hemispherical, not excluding the church of S. Mark itself; while the latter is a type of "the crossings" of numerous churches lying in a district of which Milan is the centre.

It may be observed, by the way, that we find the very ancient church of S. Costanzo, in the island of Capri, with a crossing like that of S. Jacobo, and in other respects this church is very similar to it in arrangement, though somewhat more extended.

Besides these there are the baptistery at Padua, and S. Giulia at Brescia, neither of which are of any great value in our present investigation, since they are little more than compartments, square in plan, covered by hemispherical domes.

# CHAPTER III.

#### INTRODUCTION OF RECTANGULAR PIERS.

WE are now prepared to continue our investigation of the Basilican churches, and to show in what way the churches spoken of in the last chapter affected the general development of architecture.

We shall not, however, confine ourselves to the Basilican churches, but consider also those of the other forms, since the latter are not sufficiently numerous to require a chapter to themselves.

The wooden roof was used in the naves of the Basilican churches for a considerable time, on account of the impossibility of constructing vaulting over such large spaces bounded by walls supported on colonnades of single columns. The doubling the columns, after the manner of the colonnades in the churches of S. Costanza, and

S. M. Maggiore, Nocera, seems never to have occurred to the builders. As it was, they adopted a far better method, and one which forms an important step in the development of architecture.

One example, however, exists among the early Basilican churches, in which the central aisle is vaulted by a semi-cylinder, namely, the church of S. Maria in Cosmedin, Rome. In this church the breadth of the main aisle is small compared with those of the other Basilican churches; and the partition walls are strengthened by the division of the arcade on either side into three distinct parts, by means of masses of wall, or rectangular piers, which break the line of columns. We afterwards find that rectangular piers, interrupting the series of columns, were introduced with some system, the columns and piers being arranged in sets of two or three together, but more commonly alternately. Later on, churches were built in which the arches were supported on rectangular piers alone, the columns being entirely discarded.

Besides S. M. in Cosmedin, there are the churches of S. Clemente, Rome; S. Costanzo,

Capri; and S. Maria in porto fuori, Ravenna; in which rectangular piers are partially, and, for the most part, irregularly introduced.

In the following churches we find the columns and piers placed alternately, namely, in S. Giovanni in fonte, S. Lorenzo, S. Gio. in Valle, Verona.

In S. Mark's, Venice, the columns stand in threes and fours, and the piers in pairs, see fig. 1, Plate VIII. Finally, the longitudinal arches are supported on rectangular piers alone, in SS. Vincenzo ed Anastasia alle tre fontane, Rome; S. Stefano della porta, Genoa; S. Salvatore, S. Pietro, and S. Cristofero, Lucca; S. Apollinare, and S. Pietro, Assisi; S. Stefano, Verona; S. Giorgio, and S. Maria di Castello, near Bergamo; S. Fidele, Como. The last named is interesting, in that it has galleries opening into the central

<sup>1</sup> It is worthy of remark, that the windows of this church are each blocked up by a lamina of stone, pierced with circular holes of equal radius, which gives us a rude attempt at tracery. There is also a circular window in the Coro, filled in like manner, and pierced by four holes, the piece of stone at the centre being cut away, so as to leave a quatrefoil. See fig. 6, Plate VI.

aisle, by arches resting on rectangular piers, similar to those which separate the aisles.

S. Maria in Cosmedin is remarkable in another respect; for we find the arcades nearest the apse have their extreme arches resting on columns half embedded in the piers. Thus the piers present to us a plane face, with a semi-column attached, indicating clearly that form of compound pier, so much used afterwards, which may be described as having a rectangular trunk, with semi-columns set against the four faces.

This pier was at first used in its imperfect state, that is, with semi-columns attached only to the transverse faces. The longitudinal faces were supplied with shafts, which had their origin in arrangements introduced for the support of the roof, as we shall now show.

In the last chapter it was remarked how the roof of the round church of S. Angelo, Perugia, was supported by means of arches placed diametrically across the central part, the lateral

<sup>&</sup>lt;sup>2</sup> By longitudinal faces is meant those faces of the piers which are turned towards the aisles, the transverse faces being at right angles to the former.

thrusts of which were counteracted by semi-arches thrown over the surrounding aisle.

A method quite similar to this was adopted in the Basilican churches; that is to say, arches were placed transversely across the central aisle, strengthened by smaller arches thrown over the This arrangement can be seen in side aisles. S. Prassede, Rome, and in S. Miniato, near In both, the transverse arches support Florence. In the former these arches rest wooden roofs. on rectangular piers, which take the place of every third column in the colonnades; in the latter they rest on semi-columns, set against the longitudinal faces of the rectangular piers. piers have also semi-columns set against their transverse faces, supporting the longitudinal arches, so that they are perfectly compound.

In S. Agata, Ravenna, also, we find transverse arches partially, and very irregularly introduced, resting on rectangular piers, which, as well as those of S. Prassede, were additions to the original buildings, introduced for purposes of strength.

Before we proceed to the cases in which these transverse arches support vaulting, we will con-

sider the effect of the rectangular piers when introduced into the triforia.

In the church of SS. Quattro Coronati, at Rome, the triforium has a rectangular pier in place of every third column, see fig. 3, Plate IV.; in which we may notice also that three arches above stand upon two of the arches below, the triforium differing in this respect from the galleries of S. Agnese and S. Lorenzo, where the intercolumniations of both stories are equal, see figs. 1 and 2, Plate IV. S. Lorenzo, Verona, and the Duomo at Genoa, have also triforia, with columns and piers placed alternately, the piers being rectangular blocks, with semi-columns set against their transverse faces.

We have thus seen how important a step in the development of triforia took place by the introduction of rectangular piers among the columns. Before passing on to the consideration of the changes which these piers effected in the round and polygonal churches, it will be desirable to notice briefly the next step in the development of triforia, which was made by adopting two planes of decoration, in a manner already pointed out in the baptistery at Ravenna. For example,

in the Duomo at Pisa we find that the pierced arches of the triforium are included in a panel-arch. See fig. 4, Plate IV.

In the nave of this church each panel-arch includes two pierced arches; in the choir three; and where the partition walls cross the transept into which the triforia open, we find the panel-arches including four open arches. The Duomo at Modena also has a triforium formed of panel-arches, including three pierced arches, as in the choir of Pisa. Also, in the church of S. Donino, Borgo San Donino, we have triforia, in which the panel-arches include four open ones.

We may now consider the triforium to have perfectly developed. In later churches it rarely appears: the Duomo of Lucca, however, an exception, see fig. 5, Plate IV. In this instance two panel-arches exist over each pierarch, pierced with tracery, which we may consider as another step in the increase of the planes of decoration by a process quite similar to that which transformed the triforia of SS. Quattro Coronati, Rome, to those of the Duomo It will be seen, in referring to the above figure, that the position of the panel-arches in

the Duomo at Lucca, is one that belongs rather to a clerestory, than to a triforium, as their vertices rise somewhat above the spring of the vaulting.

In the round and polygonal churches piers of rectilinear plan were also introduced.

At first they were simply masses of wall, of a form which would have naturally resulted had the churches been excavated; afterwards they became imperfectly compound by the introduction of shafts set against their diametrical In S. Stefano, Rome, for example, the outer wall, which originally communicated by means of arcades with another aisle, the ruins of which yet appear, shows that the arches were arranged in sets separated by masses of The octagonal church of S. Ravenna, also has piers of a form naturally resulting from the plan of the church, placed The arrangeat each angle of the octagon. ment between the piers may be seen in fig. 7, Plate V., where it will be noticed that there is an upper and lower arcade, the one communicating with a gallery, and the other with an aisle, both of which are carried round seven sides of the central part.

It will, moreover, be perceived, that the arrangement displayed in these apses, although unique, has no part which may not be conceived to have been suggested by that which already existed in earlier churches.

For, if we turn to fig. 3, Plate IV., we shall see that the partition walls of S. Agnese are treated in a manner very similar to that adopted in each of the seven apses of S. Vitale.

The Duomo Vecchio, at Brescia, is a round church, in which all the supports of the partition This church is, therewall are rectangular piers. fore, among the round churches what SS. Vincenzo ed Anastasia is among the Basilican churches. In the baptistery at Pisa the lower arcade has a pier in place of every third column, and the upper arcade, which communicates with a gallery above the aisle, has its arches entirely supported on piers. The piers, however, in this baptistery are not merely rectangular blocks, shafts in the form of ribbons, instead of semicolumns, attached to the diametrical faces of the rectangular blocks. These shafts may be termed In Pisa, also, we find another ribbon-pilasters. round church, namely, that of S. Sepolcro, where

the supports of the partition wall are piers, formed like those in the baptistery; but, instead of supporting round-headed arches, as in all the above instances, they support pointed arches.

### CHAPTER IV.

#### COMPOUND -PIERS.

We have seen that the vaulting of the central aisle by a semi-cylinder disturbed the arrangement of the arcades by introducing rectangular piers with shafts attached to their transverse faces.

We have also seen that the transverse arches, which were introduced for the support of the roof, completed the symmetry of the compound pier by supplying the shafts attached to their longitudinal faces.

Now this pier may be considered as the germ of all piers having rectangular trunks.

It has four different forms; for the shafts which are set against the four faces of the trunk may be either semi-columns, or ribbon-pilasters. In the first case, also, the diameter of the semicolumn may be either equal or less than the breadth of the face against which it is set, as in figs. 3 and 4 respectively, Plate VII.; and, in the second case, the breadth of the ribbon-shafts may be either equal or less than that of the faces; see figs. 5 and 6 of the above Plate.

These, then, are the four forms of the compound pier with rectangular trunk in its simplest state. We will now proceed to show the forms this pier took when the addition of new members made it more complicated.

It will be seen further on that the vaulting became constructed upon diagonal, as well as longitudinal and transverse arches. Now, under the operation of the law, "That every artifice of the construction must be displayed," the system of arches on which the vault rested was made as prominent as possible, as has been already stated in the Introduction. Hence the diagonal, as well as the longitudinal and transverse arches were completed by the adoption of separate shafts for their support, these shafts forming inferior members of that group which made up the compound pier.

The position they assumed, however, in the compound pier differed. But in most instances, and those the most complete, they were introduced

in the form of nook-shafts, in a manner similar to that already described in the instance of S. Maria in Navicella, where we have seen that Classical columns were placed in nooks excavated at the angles formed by the apse and the end wall of the nave.

Now the piers were prepared to receive the nook-shafts in the following ways.

To the four faces of the pier whose plan is seen in fig. 5, let us attach semi-columns or ribbon-pilasters, then we shall obtain the forms represented in figs. 7, 8, 9, and 10, where we may observe that all these piers have nooks ready to receive their nook-shafts.

If, moreover, to the pier of fig. 6 we attach semi-columns, we shall obtain the forms drawn in figs. 11 and 12, both of which present to us the plan of a double-nooked pier.

If also to fig. 9 we attach semi-columns, we shall get the form represented in fig. 13, which is the plan of a three-nooked pier.

From these we may obtain, by making a few slight variations in their forms, all the piers which have rectangular trunks in the churches we are going to describe. The variations in form spoken of are as follows. Sometimes we find the exterior shafts of semi-octagonal plan, also nook-shafts octagonal, hexagonal, or quarter columns instead of whole ones; the latter form may be seen in fig. 15. Sometimes narrow ribbons of stone are placed vertically against both the interior and exterior shafts, just as we see in the shafts of the cylindrical compound pier whose plan is drawn in fig. 19.

We also find piers of the forms represented in figs. 4 and 7, with the angles of their trunks chamfered as in fig. 16, also piers of the form seen in fig. 5, with nook-shafts square in plan and greater than the nooks; see fig. 14.

These variations are, however, of little importance, and we may include all compound piers with rectangular trunks in four divisions:—(1) without trunks; (2) single-nooked; (3) double-nooked; (4) treble-nooked, remembering that any of these may have their exterior shafts either semi-columns or ribbon-pilasters.

<sup>&</sup>lt;sup>1</sup> It will be convenient, when we have to speak at the same time of the nook-shafts and the shafts set against the faces of the piers, to call the first the interior shafts, and the last the exterior.

In the double-nooked pier, one of the nooks is in general nugatory, bearing no shaft.

In the treble-nooked pier, the central nook most frequently bears the shaft, and is for the most part deeper than the other two.

Besides piers with rectangular trunks, we shall find piers whose trunks are cylindrical masses. When simple, these piers take the form of monster columns, and differ from the Classical columns chiefly in the capitals, which are for the most part very shallow, and ornamented in a manner quite different from that of any of the Classical orders.

There are instances, however, in which these distinctions are so little defined, that the cylindrical pier almost approaches the column in every thing but the correctness of its detail.

Compound piers with cylindrical trunks are formed by attaching ribbon-shafts or semi-columnettes vertically to the surface of the cylinder, and sometimes combinations of these, such as

<sup>&</sup>lt;sup>2</sup> The term columnette is used here of a shaft in the form of a column with a radius very small compared with its length.

ribbon-shafts mounted on semi-columnettes. The plans of some of these piers may be seen in figs. 17, 18, 19, Plate VII.

Among the cylindrical piers we may also place those which are polygonal, and also piers whose trunks are equilateral prisms.

Piers of the latter kind may be found in company with cylindrical piers in the churches of S. Maria dei Frari, and SS. Giovanni e Paolo, at Venice. In the first of these two churches, the piers we are alluding to have semi-columnettes attached to the three sides of the prism of diameters less than the breadth of the sides. In the last, the diameters of the semi-columnettes are equal to the breadth of the sides. See figs. 20, 21, Plate VII.

We may notice here, also, piers composed entirely of clusters of columns or columnettes. For example, in S. Sisto, Viterbo, we find a pier made up of four columns so twisted that the capital of one overhangs the base of a neighbour.

In S. Francesco, Bologna, there are piers composed of sixteen columnettes of three different sizes, arranged in a manner so unique and beautiful that they deserve a careful consideration. The plan of these piers may be seen in fig. 23 of Plate VII. Their construction may be described in the following way: if we place two squares so that the points of intersection of their diagonals coincide, and so that the diagonals of the one are at right angles to the sides of the other; the angles of one square will determine the positions of the four columnettes of the largest size, their radii being equal to a line dropt from their centres perpendicular to the sides of the other square.

The eight points in which the sides of the squares intersect one another form the centres of the eight smallest columnettes, the radii of the latter being chosen so that they shall be in contact with the largest columnettes. The four columnettes of intermediate size have their centres in the intersection of the diagonals of one square with the sides of the other, and their radii are chosen so that they shall stand in contact with the eight columnettes of smallest size.

In the Duomo at Genoa we find still more complicated piers, consisting each of twenty-four columnettes arranged as below.

The description will be better followed, if we

turn first of all to the ground plan of these piers which is drawn in fig. 22, Plate VII.

The twenty-four columnettes are of four different sizes; the four greatest are nearly of the proportion of columns, and are constructed of red They are placed at the angles of a square as in the last-mentioned pier. columnettes of next size, constructed out of black marble, are arranged two and two with their centres in the sides of the square, their radii being so chosen that they stand in contact with the columnettes of red marble, and with each To determine the positions of the reother. maining columnettes, we must draw another square equal to the former, and placed relatively to it, just as in the case of the piers of S. Francesco Then its angles will determine the at Bologna. positions of four columnettes of the third size, formed out of white marble, and of radii such that they stand in contact with the black columnettes.

Finally, there are eight white columnettes of smallest size, placed in the exterior nooks formed by the black and red columnettes.

We shall now be prepared to continue the his-

tory of the development of architecture in Italy, passing on to the consideration of those churches in which the piers are compound. It will be convenient to commence with the churches in which all the piers have rectangular trunks, proceeding afterwards to those where we find cylindrical piers, or compound piers with cylindrical trunks.

# CHAPTER V.

# CHURCHES CONTAINING COMPOUND PIERS WITH RECTANGULAR TRUNKS.

As yet we have only considered cases in which the central aisle (if vaulted at all) is covered by a semi-cylinder, and the side aisles by Roman vaulting. The latter vaulting was frequently strengthened by transverse arches crossing the side aisle at each column; or rather the longitudinal surface was made to rest upon transverse arches, placed so as to form the boundaries of compartments square in plan, each of which had a transverse semi-cylinder intersecting the longitudinal one.

Now this method of vaulting was also introduced into the central aisle, which being in general twice as broad as the side aisles, required a transverse arch to be placed at every other column only, for the support of the longitudinal surface. The alternate columns, therefore, were replaced by compound piers, upon one of whose shafts the transverse arches were made to rest, the intermediate columns either remaining in their places; or simple piers, and imperfectly compound piers wanting the shaft of the longitudinal face turned towards the central aisle, being substituted for them.

We shall thus have to consider churches in which we find columns and compound piers arranged alternately, and others in which there are rectangular simple piers, or imperfectly compound ones, placed alternately with perfect ones.

And besides these two modes of building, we shall find another still more generally adopted, in which all the piers are compound. For, as soon as the pointed arch came into general use, the vaulting of spaces having a greater latitude than longitude became also common; for there can be no doubt that the introduction of that form of arch greatly facilitated the construction of vaulting over such spaces, although they had been vaulted before, in a few instances, without its aid. Now, in this method of vaulting we find

transverse arches crossing the aisles at every support of the partition walls; hence these supports are all perfectly symmetrical compound piers of some one of the forms described in the last As the examples of the third method chapter. of building are by far the most numerous, we shall find it convenient to consider them first; since, by their number, they enable us to point out more steps in the development of architecture, and give us a series of less abrupt changes than we can obtain in the present day from the examples of the other two methods. It is not improbable, however, that before the mutilations and modern restorations which so many of the churches of Italy underwent, we should have found examples which would have given us in each of the three cases sufficient materials to form a complete series of steps, without being obliged to make any abrupt changes at all.

To begin, therefore, with the consideration of churches, whose partition walls rest on series of uniform compound piers. These churches follow from those in which all the supports are simple rectangular piers, by merely supplying the piers with the proper number of shafts. Before we

arrive, however, at perfectly symmetrical compound piers, there is an intermediate step, of which S. Teodoro at Pavia is an example.

In this church the rectangular blocks have only three shafts each; those set against the transverse faces, supporting the longitudinal arches, and the remaining ones the transverse arches, crossing the side aisles. It is true this church has at present transverse pointed arches thrown across the central aisle, on which the wooden roof is supported, and these rest on rectangular blocks set against the old piers; but they are, without doubt, additions to the original church, whose piers were such as we have just described above.

In the Duomo at Siena the shafts wanting in S. Teodoro have been supplied, in order to support the transverse arches on which the vault rests. This purpose is effected, however, in such a manner, that the new vertical members do not destroy the continuity of the horizontal ones; for the shafts finish with capitals immediately under the cornice which runs above the longitudinal arches. And they are made to bear the weight of the transverse arches by means of ribbon-

pilasters, which, standing upon the cornice, rise above each shaft.

Here, then, we have, for the first time, a regular series of perfectly compound piers, and together with them, vertical members have been introduced, which rise from the ground to the spring of the vault. See fig. 1, Plate III. We must particularly notice, however, that the continuity of the vertical members is broken by the unbroken horizontal member, since the changes we are about to consider have reference to the relative continuity of those members which present to the eye prominent, vertical, and horizontal lines.

The next example, namely, the church of Casamari, of which there is a portion represented in fig. 2, Plate III., will show us a succeeding step in architectural development; for here we find the horizontal member has greatly diminished in strength; and although as yet continuous, it is compelled to pass round the vertical members, which have advanced, we may notice, a step towards continuity, for they have the same horizontal section both above and below the string-course. Another example of architecture in this stage of progress, as far as the horizontal member is concerned, is

the Duomo at Lucca, of which a part is drawn in fig. 5, Plate IV. But here another step has been accomplished; for the vertical members have become more prominent than heretofore by the addition of nook-shafts to the compound piers and pilasters above.

In a previous chapter it was remarked that, as the theory of vaulting progressed, it was found expedient to construct the vault on diagonal, as well as on longitudinal and transverse arches; and the nook-shafts in general, indeed, in all the succeeding examples, support these diagonal arches, the piers being, as we have shown in Chapter IV., prepared to receive them.

In some instances, however, proper nook-shafts are not introduced into the piers; that is, when the piers have their faces very much broader than the shafts set against them, in which case the angles of the trunks are used as edge-shafts, from which the diagonal arches spring.

We may notice, by the way, that, in general, when proper nook-shafts are used, the right section of the diagonal arches gives the same figure as that of the nook-shafts; that is, a circle, octagon, or hexagon. On the other hand, when the edges

of the piers are made to support the diagonal arches, their right section gives us a square.

It would thus appear that, as the introduction of the transverse and longitudinal arches completed the compound pier by giving it the exterior shafts set against its four faces, so the diagonal arches gave it the interior or nook-shafts. The adoption of diagonal arches we may easily conceive to have been suggested by the diametrical arches of S. Angelo, Perugia, which were described in the second chapter.

In the next two examples which will be adduced, we find the only horizontal member is a string-course or system of string-courses, placed at the spring of the vault, forming a link which connects the capitals of the vaulting shafts; see the Duomo at Florence, and the Duomo at Como.

We will now pass on to a number of churches in which there are no horizontal members at all, the vertical members, however, still remaining, as in the last examples, broken into two parts by means of the capitals at the spring of the longitudinal arches. They are, S. Maria in S. Angelo in Vado; SS. Nazario e Celso, and the Duomo, Verona; S. Petronio, S. Procolo, and S. Martino,

Bologna. Of the last named a part has been drawn in fig. 3, Plate III. In S. Angelo, S. Procolo, and SS. Nazario e Celso, the nook-shafts are wanting, and there are no diagonal arches in the vaulting of the first two. The shafts which support the transverse arches are moreover ribbon-pilasters standing with proper bases on the capitals of the piers; the pilasters, therefore, and piers having different right sections. In the Duomo at Verona we find diagonal arches and corresponding nookshafts; but here, also, the shafts above the capitals of the longitudinal arches are different in right section from those below.

This church, by the way, has a great similarity to certain churches we shall have to notice with piers having cylindrical trunks; and the piers are so formed, that on a superficial view we should be inclined to place them among the cylindrical piers, although a more careful investigation shows them to belong to piers with rectangular trunks. In S. Martino, as we see in the Plate, and also in S. Petronio, the piers are of the same plan above and below the capitals of the longitudinal arches, so that the capitals themselves become simply bands of ornament, breaking the

otherwise continuous shafts of the vaulting system.

In the Certosa at Pavia we find this band of ornament reduced to a single string-course, passbetween round the vaulting shafts capitals of the shafts which support the longitudinal pier-arches. This string-course is all that now remains to be taken away to leave the vaulting shafts entire without any break from the ground to the spring of the vault, as may be seen in the Duomo at Arezzo, fig. 4, Plate III.; in SS<sup>ma</sup> Trinità, and S. Maria Novella, Florence; in S. M. sopra Minerva, and the modernized church of S. M. del Popolo, Rome; in S. Pietro in Cielo d'oro, Pavia; and in S. Maria, Città di Castello.

In the Duomo at Arezzo we see from the Plate that there exists a string-course at the spring of the vault which none of the other churches possess. This, however, may possibly belong to the old construction before this church was reduced to the form in which we now see it.

We have now only to cause the shafts of the longitudinal arches to rise up so that their capitals may join those of the vaulting shafts, to obtain a complete system of vertical members rising from the ground to the spring of the vault without any break at all. This last arrangement may be seen in the churches of S. Antonio Abate, Isola; S. Giovanni di Prè (in part), Genoa; and in S. Eustorgio and S. Simpliciano, Milan. The latter has a portion drawn in fig. 5, Plate III.

Thus we have traced through its different stages the progression of the vertical members, together with the simultaneous disappearance of the hori-And we have seen that the horizontal members were at first continuous, while no proper system of vertical members existed; that in process of time a system of broken vertical members was formed, which, without immediately destroying the continuity of the horizontal members, obliged them to change their plane, and pass round them; that, next, they destroyed their continuity, and left the horizontal members in the form of slender string-courses, which gradually died out, while the vertical system became continuous by degrees, first in some of its inferior members, and then in all. We began, therefore, with a system of continuous horizontal members without any vertical system, and end with a vertical system, and an entire absence of those

members which present to the eye prominent horizontal lines.

Before concluding this chapter, we have yet to consider three remarkable churches at Naples, which have undergone at different periods considerable alterations, and perhaps even partial rebuilding, making it difficult for us to treat of them side by side with those above. The first we shall notice is S. Lorenzo, which in ground plan is identical with the ancient transeptal Basilican churches, and like them it has a wooden roof over the central aisle and transept. church is considerably modernized, but it seems highly probable, that originally the partition walls were supported on round-headed arches springing from columns, and that a cornice was carried above the arches, quite after the Basilican fashion.

The second is the Duomo, which in ground plan, and as respects the roofing, is like S. Lorenzo. But the longitudinal arches rest on rectangular piers with semi-columns attached to their transverse faces. Above the arches a cornice formed of string-courses is placed, broken by no vaulting shafts. In both churches we see arrangements which have the appearance of con-

siderable antiquity, and according to the order which we have adopted, they ought to be placed at least before the Duomo at Siena.

This position, it is true, does not agree with the dates ordinarily assigned to them; but it remains a question whether they are not in reality old churches which underwent alterations and reconstruction at the time when they are commonly said to have been built. It may be, on the other hand, that the adoption of a wooden roof, from some cause or other, instead of vaulting, led to the older arrangements, in these particular instances, at a time when the general introduction of vaulting was followed in other places by a system of vertical members. In both churches the arrangement of the shafts of those piers which support the transverse arch by which the transept is entered, is of a later character. The shafts are broken by capitals placed under the cornice which crosses the pier in a manner similar to the piers in the Duomo at Como, and that at Florence described in this chapter.

S. Domenico, also, in the same city, is a church not unlike the Duomo, having, however, a complete "crossing," and the transept vaulted.

Here the arrangement of the piers of the crossing is of a still later character, the shafts rising to the capitals at the spring of the transverse arch, broken only by strings at the spring of the longitudinal arches, in a manner similar to the piers of the Certosa at Pavia.

We have seen, therefore, that there is some difficulty in assigning to these churches their due positions among the rest, on account of the above peculiarities; and here it would be too great a digression to enter into the question as to whether they arise from the alterations which the churches have undergone at various times, or from the All that can be influence of foreign architecture. said is, that, as they are at present, they stand out in a marked manner from the other churches of Italy; and the last two especially, on account of the peculiar construction of the pier-arches, which have semi-roll-mouldings, corresponding to the exterior shafts of the piers, a treatment of the arch rarely found in Italy, and one which would seem to show that some foreign influence, perhaps that of French architecture, had been brought to bear upon them.

# CHAPTER VI.

CHURCHES WITH COMPOUND PIERS AND COLUMNS,
OR COMPOUND PIERS AND SIMPLE PIERS, PLACED
ALTERNATELY.

In this chapter we will first of all consider those churches in which the partition walls are found resting on columns and compound piers arranged alternately.

This arrangement, it is clear, is simply an extension of that in which we find columns and simple rectangular piers placed alternately, examples of which have been given already in Chapter III. If to the rectangular piers of one of the latter churches we set semi-columns against their transverse faces, we shall obtain a combination of columns and imperfectly compound piers, which is the first step towards the introduction of perfect ones. We may see this carried out in a part of S. Sofia at Padua, fig. 2, Plate

In this church, although vaulting exists, it is of later introduction, and the transverse and diagonal arches are made to rest on brackets, so as not in any way to disturb the arrangement of the piers. However, in SS. Pietro e Paolo, one of the seven churches forming the group dedicated to S. Stefano at Bologna, we find the transverse arches supported on ribbon-pilasters which stand on semi-columns set against longitudinal faces of the piers; so that here we see the columns placed alternately, with perfectly symmetrical compound piers, and moreover vertical members reaching from the ground to the spring of the vault, as in fig. 3, Plate VIII. S. Zenone, Verona, a somewhat similar arrangement may be observed, except that the vaulting shafts above and below the spring of the longitudinal arches are of the same right section, so that they only require the removal of the groups of capitals to form together a system of continuous vertical members; see fig. 4, Plate VIII.

This is attained in S. Francesco, Padua; S. Francesco, Pavia; and S. Tomaso, Genoa; where the vaulting shafts are unbroken from the ground to the spring of the vault. S. Tomaso is a good

type of the rest, and is therefore drawn in fig. 5, Plate VIII.

These three churches have all horizontal string-courses connecting the capitals of the vaulting shafts, and no proper nook-shafts for the diagonal arches. In the church of SS<sup>ma</sup> Annunziata at Bologna, however, we find the nook-shafts introduced, and even the horizontal string-course has disappeared; see fig. 6, Plate VIII.

We find, then, that although the examples of churches containing compound piers and columns arranged in the same series of supports, and generally alternately, are few, yet they are sufficient to show that they have many steps in their development of a like nature to those pointed out in the last chapter respecting churches in which all the supports are compound piers. And also, that in both kinds of architecture a struggle took place between the horizontal and vertical members, the horizontal system dying out as the vertical system perfected itself.

Let us turn now to churches where perfect compound piers are found placed alternately with simple piers, or with imperfectly compound ones. It will be convenient to call these piers, respectively, primary and secondary. In all the following cases we find the primary piers have their vaulting shafts unbroken from the ground to the spring of the vault. The first church to be considered is that of S. Ambrogio, Milan, which owes its position in this chapter to alterations which it has undergone, for, in its earliest condition, the piers had probably no vaulting shafts at all, the roof being of wood. Certainly the present vaulting and its accompanying transverse arches are of a time later than the rest of the church.

In fig. 1, Plate IX., there is a drawing of this church as we may consider it to have been originally, and in fig. 2 of the same Plate we see it as it at present stands, at least the greater part of it.

We see that in its presumed original condition it differed in the arrangement of the partition walls from the Basilican church of S. Agnese, Rome, only in having imperfectly compound piers in place of columns. It will be noticed, also, that the introduction of vaulting and its accompanying shafts has entirely altered the character of the church. As it is now, it presents to us an ar-

rangement which became the basis of a local style, and some of the other churches we are about to consider may be looked upon as imitations of it.

In Pavia, also, we have the church of S. Michele, which in its original state must have differed in no material respect from S. Ambrogio.

This church most probably had also originally a wooden roof, and the present vaulting is most likely of later date even than that of S. Ambrogio.

It is much more complete and regular; and, in addition to the transverse arches supported by the primary piers, we find others supported on shafts which have caused the secondary piers to assume a perfect form, though less complex than the primary piers. The vaulting compartments, consequently, are not like those of S. Ambrogio, square in plan, but have a greater latitude than It will be interesting to observe, howlongitude. ever, that in S. Ambrogio we find one bay similarly arranged to those of S. Michele, namely, that next to the compartment which the octagonal dome covers. We may also notice the church of S. Celso, Milan, which, as far as it goes, is like S. Michele in arrangement, but it possesses no

galleries over the side aisles, the vaulting and its transverse arches springing from the corbeltable, which runs above the pier-arches.

The next example which we shall take into consideration is the Duomo at Borgo San Donino, see fig. 3, Plate IX., where we see that the secondary piers are octagonal, and the arches of the gallery are formed into panel-arches, each pierced by four open arches resting on columns.

We may adduce, also, the church of the monastery of Chiaravalle, near Milan, drawn in fig. 5, Plate IX., which was probably originally like S. Teodoro at Pavia, described in the last chapter.

In this case, the partition walls rest on round arches springing from imperfectly compound piers, the vaulting shafts supporting transverse arches at every other pier, thus completing their symmetry, and giving to this church a place among those which are distinguished by having primary and secondary piers. All the piers, up to a considerable height, are inserted in a cylindrical envelope, probably as a protection against the floods to which this church is subject: there is no difficulty, however, in ascertaining their proper forms on examination. S. M. del Carmine, Pavia,

is almost a copy of Chiaravalle in brick, with pointed arches in place of round-headed ones, and with rather more complete primary piers supplied with proper nook-shafts; see fig. 6, Plate IX.

Also S. Salvatore, near the same city, is in arrangement very similar to these, but has suffered a good deal from modern restorations. Then again at Alatri, in the Papal states, we find the church of S. M. Maggiore, which has in part a like arrangement, with this peculiarity, that the longitudinal arches are compound, the sub-arch being a trefoil.

We ought also to notice here the nave of S. Antonio at Padua, see fig. 4, Plate IX., which has primary and secondary piers, and, with the exception of the vaulting, which is copied from S. Mark's, Venice, is arranged similarly to these The churches. longitudinal arches, however, pierce a wall capped with a balustrade, forming a screen between the nave and the side aisle, which also is in imitation of the arrangement adopted in S. Mark's. Both these churches have parts represented, S. Mark's in fig. 1, Plate VIII., and S. Antonio in fig. 4, Plate IX., whence we may judge how much the latter has borrowed from the former.

This brings us to the end of our investigation of churches in which the compound piers have rectangular trunks, and we have seen how naturally they emerge out of churches with simple rectangular piers, whose origin has been traced to certain changes which took place in the Basilican churches. We have noticed also how separate themselves into three distinct varieties, depending upon the kind of vaulting used, and the consequent form of the supports of the partition walls. We have traced, also, the development of each of these varieties as far as the number of examples will admit, and shown how they all pass through similar phases as they develope.

We will therefore for the present leave them, and proceed to consider churches in which we find massive cylindrical piers, or compound piers with cylindrical trunks; and also other churches in which Classical columns appear supporting pointed arches. After which, the main steps which have been pointed out in all these varieties will be classified, in order that the direction in which architecture developed may be comprehended with greater ease.

# CHAPTER VII.

### CHURCHES CONTAINING CYLINDRICAL PIERS.

THE churches we are about to consider in this chapter possess either simple piers with cylindrical shafts, or compound piers whose trunks are cylindrical, such as were described towards the end of Chapter IV.

To begin with those cases in which we find the piers all simple. Perhaps the earliest of these churches are the Duomo and S. Maria Carrobiolo, Monza, in which the form of the longitudinal arches is not quite semicircular, but is determined by an arc less than a semicircle. This is the case more especially in the Duomo, and they remind us of the arches in the Duomo at Narni, which was described in the first chapter.

In the Duomo at Monza transverse pointed arches have been introduced for the support of the vaulting in the part situated towards the Coro.

They are made to spring from pilasters standing on the capitals of the piers. These are, however, of later times, and are only worthy of note because in subsequent buildings we find similar arches introduced regularly, so as to spring from pilasters resting on every pier.

In the following examples, the pier-arches are semicircular, namely, in the cathedrals of Prato, Pietra Santa, Sarzana, and Borgo San Sepolcro; also in the church of S. Abbondio, Como.

In most instances the roofs are of wood, but in some the central aisle is vaulted by a semi-cylinder, not requiring the support of transverse arches. Where the latter are found, they belong to restorations, and not to the original buildings. churches we are considering the piers are for the most part very lofty compared with the height of the partition walls, especially in the later examples, leaving no room for a triforium or even a proper clerestory, the roof springing from a cornice very little above the longitudinal arches. The Coro of S. Sisto, Viterbo, is another example which illustrates this mode of building. Also, the Duomo at Orvieto should be noticed here, since its piers are of the kind we are considering, but it differs from

the other churches in having a lofty clerestory and a very prominent horizontal cornice above the pier-arches. This church is indeed altogether of a much later date than any of the above, and cannot be considered as a pure example of this style, but rather as a curious compound of styles, partaking more of the character of the above churches than of any other.

In churches with piers having rectangular trunks, little note was taken of the introduction of the pointed arch in place of the semicircular one; and this because it did not in them entirely supersede the use of the other, nor does it form in them so important a feature as the plan of the piers and arrangement of the vaulting system.

In the churches, however, to which we have devoted this chapter, the change of the form of the arch is more important, since the pointed form entirely superseded the other, and moreover was introduced simultaneously with vaulting, accompanied by transverse arches supported on pilasters resting on each pier.

The following are the churches in which these changes may be remarked: S. Pietro Martire, Monza; S. M. del Carmine, Milan; S. M. della

Corona, drawn in fig. 1, Plate II., and S. Anastasia, Verona; the latter, also, has a part represented in fig. 2, Plate II.; S. M. dei Frari, and SS. Giovanni e Paolo, Venice.

In the first three, the pilasters are simply ribbon-shafts; in the remaining three, they have the addition of nook-shafts, which support diagonal arches upon which the vaulting is constructed. None of these churches have triforia, and even no proper clerestory exists in them, for the vertices of the pier-arches reach nearly to the level of the spring of the vault, and in some even above this level.

The cases in which we find compound piers with cylindrical trunks are only three in number, namely, S. Francesco, Bologna; S. Andrea, Vercelli; and the Duomo at Milan. S. Francesco has piers alternately simple and compound. The simple piers are octagonal in plan, and the compound piers are cylinders set round, some with semi-columnettes, others with ribbon-shafts. Both the compound and simple piers have pilasters standing on their capitals for the support of the vaulting arches, the former supporting pilasters of three shafts, and the latter pilasters of one only. The

primary piers of this church, together with the accompanying parts, have been represented in fig. 3, Plate II. In the Duomo at Milan we find that the piers are all alike, being cylinders set round each with eight semi-columnettes, four of greater radius than the others, with which they are arranged Also to each semi-columnette is atalternately. tached a ribbon-shaft. In this church the piers do not finish in a proper capital as in S. Francesco, but the vaulting shafts rise up to the spring of the transverse and diagonal arches. In the main aisle, they, so to say, pierce through a cluster of niches, which envelope the pier at the spring of the longitudinal arches. In the inner side aisles the piers have no niches, the vaulting shafts rising without any break to the spring of the vault, excepting only some ornamental panel-work which is attached This last arrangement of the shafts is to them. also to be seen in S. Andrea, Vercelli, and still better than in Milan cathedral, since in this instance no panel-work encumbers the shafts; see fig. 4, Plate II.

In the outer side aisles of the Duomo at Milan, all the shafts, even those of the longitudinal arches on which the vault rests, rise up from the ground to the spring of the vault without any break; see fig. 5, Plate II. Here, then, we obtain a complete system of unbroken vertical members.

In the Duomo at Perugia, and in S. Francesco, Gubbio, we also find the transverse, longitudinal, and diagonal arches springing from the same capital; the piers in these instances are, however, simple, and octagons in ground plan.

We have now arrived at the latest arrangement in these churches, and one very similar to that attained in those which contain piers with rectangular trunks. Also we have seen that the steps in the development of both kinds of architecture were very similar, as will still more readily appear in a succeeding chapter, where the principal steps have been arranged in order. Besides these two varieties which sprang from the Basilican style, distinguished respectively by the rectangular and cylindrical form of the piers; there is another also, whose origin may be traced to the Basilican In this we find the column was rechurches. tained, differing little from the Classical column, and having a capital which may be considered as a rude imitation of some one of the Classical capitals,

in general that of the Corinthian order. In the main, the plan of these churches is identical with that of the Basilican churches. They have mostly three aisles, separated by rows of columns, entering quadrilateral chapels instead of semicircular apses. But the chief thing to be noticed, and that which forms the most striking difference between these churches and the earlier ones, is the pointed form of the arches.

S. Giacomo, Venice, is the first church we shall It is especially interesting, since we find in the lower part of the church the Basilican arrangement in perfection, the columns supporting semicircular arches, as in fig. 3, Plate I. we approach towards the apse the round arches become changed for pointed ones both of greater altitude and span. A list of churches in which the columns support semicircular arches has been already given in Chapter I. Those in which pointed arches are used in part are, S. Maria delle Pieve, Arezzo; the Duomo at Pisa; Duomo at Genoa; and S. Giacomo, Venice. In the following the arches are all pointed: S. Restituta, Naples; La Madonna dell' Orto, S. Stefano, and S. Giovanni Battista, Venice. The last named has been drawn

in fig. 4, Plate I. All these churches, with the exception of S. M. delle Pieve, have wooden roofs; we find, however, two others in which vaulting exists, namely, S. M. delle Grazie, Milan, and S. M. della Misericordia, Bologna. In both of these, ribbon-pilasters stand upon the capitals of the columns, and support the transverse and diagonal arches on which the vault rests. A part of the latter church has been drawn in fig. 5, Plate I.

Before concluding this chapter two churches require notice, namely, S. Sepolcro, one of the seven churches dedicated to S. Stefano, Bologna, and S. Chiara, Vicenza. S. Sepolcro is a church of twelve sides, and the partition wall is supported on round-headed arches, springing in one half of the building from massive cylindrical piers, and in the other half from coupled columns; the latter are placed, not as in S. M. Maggiore, Nocera, and S. Costanza, Rome, with each of a pair on a radius, but in the circumference; see fig. 5, Plate V., where both the arrangements in S. Sepolcro have been drawn.

S. Chiara is in plan an octagon, having columns placed in the angles decoratively supporting

#### 90 CHURCHES CONTAINING CYLINDRICAL PIERS.

pointed arches which alternately communicate with polygonal apses and form panel-arches. Above the vertices of the arches is a cornice in the form of a circle; and above this, set back a little, rises a clerestory of sixteen sides, which are pierced alternately by circular holes and pointed windows; see fig. 8, Plate V.

# CHAPTER VIII.

#### CLASSIFICATION.

WE will now arrange the varieties of Italian architecture, which have been the subject of the foregoing chapters, under the six following heads; A, B, C, AC, BB, and CC.

By A, we will distinguish that variety in which the supports of the partition walls are columns of any of the orders of Classical architecture, or imitations of them, or columns of the same proportions, but with capitals having little similarity in detail to those of the ancient orders.

By B, that in which the supports of the partition walls are simple piers having a circular or polygonal right section, or compound piers having cylindrical trunks as described in Chapter IV.

By C, that in which there are simple piers of rectilinear plan, or compound piers with rectangular trunks as described also in Chapter IV. By AC, that in which the supports are partly of the kind under A, and partly of that under C, placed together according to some system.

By BB, that in which we find systematic combinations of the simple and compound piers which occur under B.

By CC, that in which are found systematic combinations of the simple and compound piers which occur in the division C.

Each of the above varieties except BB has subdivisions marking the principal steps in its development, which have been already treated of at some length in the preceding chapters. Thus we may enumerate five subdivisions of A, distinguishing them by the small letters of the alphabet:

a, in which the columns support entablatures.

b, in which the columns support arches of arcs less than semicircles.

- c, in which the columns support semicircular arches, or the same stilted.
  - d, in which the columns support pointed arches.
- e, in which pilasters rest upon the capitals of the columns for the support of the transverse and diagonal arches of the vault.

B contains six subdivisions:

a, in which simple piers support longitudinal arches of arcs less than semicircles.

b, in which they support semicircular arches.

c, in which the simple piers support pointed arches and pilasters, upon which rest the transverse, and, in some instances, diagonal arches of the vault.

d, in which the piers are compound, but finish with capitals at the spring of the longitudinal arches, a shaft, or shafts standing upon the capitals for the support of the transverse and diagonal arches.

e, in which the vaulting shafts rise from the ground to the spring of the vault without any break.

f, in which the shafts of the longitudinal arches rise also to the level of the spring of the vault.

C contains seven subdivisions:

a, in which the piers are rectangular, or masses of wall depending for their forms upon the ground plan of the building, being such as would have resulted had the church been an excavation.

b, in which shafts are attached to the transverse faces of the rectangular piers.

c, in which shafts are attached to the longitu-

#### CHAPTER IX.

#### CHURCHES OF ONE AISLE.

In the preceding chapters we have exclusively treated of churches which possess at least three parallel aisles.

There are many, however, which we shall now consider consisting of one aisle only, with the addition sometimes of a transept rectilinear in plan, and frequently also chapels and apses which communicate in various ways both with the nave and transept.

The transept enters the nave by means of an arch, opposite to which is placed the apse, exactly as in the transeptal Basilican churches, considered in Chapter I. This arch rests upon rectangular blocks, which are attached to the walls of the nave, or rather are formed by the walls of the transept protruding beyond the walls of the nave. See S. Susanna, and S. Francesca Romana, Rome. In

the latter church the walls of the nave are pierced by recesses, forming two series of small chapels, which only require direct access from one to the other to constitute side aisles. This is also to be seen in SS. Cosimo e Damiano, Rome. It may be interesting to remark that in the latter church the apse is a portion of a circular temple of Classical times, covered with a dome, and lighted by a hole at the apex. The lesser half of this building has been, so to say, cut off, leaving an apse, whose plan is bounded by an arc of a circle somewhat greater than a semicircle.

It may be noticed, also, that in S. Francesca we have two rounded-headed arches crossing the transept, and so forming with the transverse arch of the nave and the apse very nearly a complete "crossing," such as we see in much later architecture.

Among the churches of one aisle we may just mention here S. M. Maddalena, Borgo San Sepolcro; and S. Bernardino, Verona; which are rectangular buildings covered with wooden roofs, having a few vaulted side chapels. Also the Duomo at Rimini, where vaulted side chapels are entered from the nave by pointed arches arranged with alternately a larger and smaller space of wall between.

We will now pass on to a number of churches having chapels either placed at one end of the nave, or attached to the wall of the transept, which lies on the opposite side to the transverse arch by which the nave is entered. These chapels are one, three, five, or even seven in number, generally square in plan, the central one being of the largest They are entered by arches either dimensions. round or pointed, which, as in the case of the great transverse arch, are simply piercings in the wall of the transept. Moreover, they are in general vaulted with transverse and longitudinal surfaces, either pointed or semi-cylindrical. The following is a list of churches of this kind:-

S. Domenico,	Siena.
S. Francesco,	Pisa.
S. Agostino,	Lucca.
S. Domenico, S. Francesco, S. Lorenzo, S. Giovanni,	Pistoïa.
S. Francesco, S. Domenico,	} Prato.
S. Domenico,	Arezzo.
S. Domenico,	Città di Castello.

Dei Serviti,
Gli Eremitani,
S. Fermo,
Verona.
S. Nicolo,
Ravenna.

We must notice one or two peculiarities existing in some of the examples comprised in the above list.

S. Francesco at Pisa, for instance, has two pointed arches crossing the transept on either side of the nave, supporting a wall which forms a continuation of the wall of the nave, the intermediate support of each pair of arches being a cylindrical pier. Also S. Francesco, at Pistoïa, has two roundheaded arches crossing the transept, which form together with the transverse arch of the nave and that entering the Coro a complete compartment, such as is seen in the crossings of the fullydeveloped Gothic. S. Domenico, Siena, and S. Francesco, Pisa, have no less than seven chapels attached to the wall of the transept which lies opposite to the transverse arch of the nave. S. Francesco, Pistoïa, has five similarly placed, and most of the others in the above list three. We do not find transepts to all these churches, but the majority possess them. In most, the naves are sufficiently broad to admit of three chapels of considerable size being attached to the Coro end. Some also have the addition of an apse forming a part of the central chapel or Coro, either semicircular or polygonal in plan.

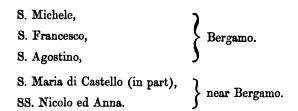
In all these examples there are no transverse arches in the nave, that entering the transept alone excepted; but churches exist, in other respects similar to these, possessing numerous transverse arches which cross the nave at given intervals, and at distances which cause the compartments bounded by them to have a very much greater latitude than longitude.

They are:-

The Duomo at Gubbio.

S. Agostino, Gubbio.

Also S. Pietro and S. Secundo fuori le mura of the same city have portions with transverse arches:—



These churches are like the former in that they

are remarkable for the immense breadth of their naves, which is so great as perhaps almost to necessitate the construction of transverse arches for the support of their roofs. The arches are in general pointed, though in one or two instances they are semicircular; and they are built as if cut out of a transverse wall by incisions perpendicular to its surface without any mouldings, shafts, or chamfered edges.

The most important thing to be noticed, howthe arrangement of the side walls. In the majority of examples the recesses formed by the masses of wall, on which the transverse arches rest, and the outer walls are preserved in their simplicity; but in the Duomo and S. Agostino, Gubbio, and in SS. Nicolo ed Anna, near Bergamo, this is not the case. In the first two, a wall with an unbroken horizontal cornice is built half-·way up the piers in contact with them. first, the piers appear under the cornice like ribbon-pilasters attached to the wall. second, the wall screens the piers. In all the compartments bounded by the transverse arches the wall is pierced in both cases by recesses with semi-cylindrical heads. In the last of these three churches the arrangement is still more complicated, and may be described in the following way.

It has rectangular piers, with a shallow moulding at their summits, supporting round-headed arches, which enter the semi-cylindrical-headed recesses.

On these piers stand ribbon-pilasters, which at the spring of the transverse pointed arches have a string-course passing over them, and continued between them, immediately above which is a gallery opening into the nave by two arched apertures separated by a column.

Above the gallery the wall is pierced by a circular window. Thus we obtain an arrangement which may almost be said to present to us a clerestory, triforium, and pier-arch story. See the portion of this church drawn in fig. 7, Plate VI.

Besides the above churches, in which the naves. and transepts are covered by wooden roofs, there are many others possessing only one aisle covered with vaulting, as, for example, S. Rocco, Borgo San Sepolcro; S. Cecilia, Bologna; S. Cristo, Vicenza; S. Maurizio, Milan; and S. Onofrio, Rome. In these the vaulting has no decorative support, and

is in most devoid of transverse arches. Others, however, have vaulting shafts attached to the walls.

- Thus, S. Vitale at Bologna has the transverse arches, on which the vaulting surfaces rest, standing on rectangular blocks set against the wall.
- S. Giacomo Maggiore, also, in the same city, has similar transverse round-headed arches dividing the nave into compartments square in plan.

In this case longitudinal round-headed arches support the transverse vaulting surfaces, forming deep panels built up half-way from the ground by a wall pierced with three semi-cylindrical-headed recesses; an arrangement, by the way, in its main features not unlike that seen in the nave of S. Antonio, at Padua.

The Certosa, near Bologna, has ribbon-pilasters supporting the transverse and diagonal arches of the vault.

In all these cases, as well as those we have yet to consider in this chapter, the vertical member supporting the vaulting arches extends from the ground to the spring of the vault unbroken by any horizontal member or capital. In the Duomo at 'Vicenza the arrangement is quite similar to that

of the churches under CCb, see Chap. VI., the longitudinal arches between any two primary piers communicating with a pair of chapels instead of an aisle.

S. Lanfranco, Pavia; S. Chiara and S. Francesco, Assisi; S. Agata, Brescia; and the unmodernized part of S. Francesco, Viterbo, have all vaulting shafts for the transverse and diagonal arches, either arranged after the manner displayed in churches of Cf, or with the transverse surfaces of the vault resting visibly upon longitudinal arches forming with the wall the heads of shallow panels, as in churches of Cg.

#### CHAPTER X.

# THE PHASES OF ARCHITECTURE VIEWED CHRONOLOGICALLY.

We have thus reviewed the steps by which Christian Architecture in Italy developed itself, confining our attention to the interior of the churches of that country.

In doing this it has been attempted to show that, although varieties exist sufficiently marked to constitute different styles, yet the changes which led to them took place in obedience to certain influences tending to develope in strength the vertically placed members, to the weakening and ultimate destruction of those members which present to the eye horizontal lines.

We will now proceed to consider the periods that ought to be assigned to those phases of Architecture which have been arranged in order in Chapter VIII. In this classification we have made three grand divisions, A, B, and C, and also three which proceed from them, indicated by AC, BB, and CC, each with subdivisions denoted by small letters. Now the architectures comprised under A, B, and C, originate at different epochs, and co-exist up to the extreme limit of the period we have been considering. Likewise AC, BB, and CC, belong to portions of this period, AC not being, however, a transition between A and C, but a composite style, partaking of the nature of both A and C. Also the architectures of BB and CC partake of the natures of those under B and C respectively, being compositions of two different phases assumed by them during their development.

The subdivisions indicate the main steps in the development of the above varieties from its commencement to its term.

We will begin by considering chronologically the churches belonging to the variety indicated by A.

Under this head is comprised a number of churches which were built at times included between the beginning of the fourth and the end of the fourteenth century. The churches of the first division, Aa, are the earliest Christian churches which can be found out of the catacombs (see the list given at page 29); and they may all, with the exception perhaps of the nave of S. Lorenzo, be placed between A.D. 300 and 350. It will not be out of place to offer a few remarks on the subject of the age of this church. The Coro of S. Lorenzo is undoubtedly of the fourth century, but the nave, although presenting the arrangement of partition walls seen in churches of Aa, is ordinarily said to have been a later addition, some placing it as late as the twelfth, others the eighth century.

From the fact that the transverse arch by which the nave and Coro communicate is lined with mosaics on the side facing the Coro, and not on that facing the nave, we may conclude that probably the apse, which is said to have once existed, had its back towards the present nave, this church having been consequently of a similar form to S. Agnese. But the entrance in this case must have been close by the apse and not opposite to it, as in S. Agnese and other churches; and this, on account of the form of the ground, which is such, that a great portion of the end opposite

to the apse is built against the rock which has been excavated to make room for the church.

Now, there is reason for supposing that an atrium existed on the site of the nave, by which the church was approached, and this was not improbably annexed to the Coro, the walls supported on the colonnades being then raised to their present height.

Should it be maintained that the nave did not originate in this manner, but, on the contrary, that it was newly built at one of the times when the church is commonly said to have been enlarged, the following questions would have to be answered.

How was it that the twenty-two Ionic columns of Classical times, as well as the pieces of ancient entablatures with which the nave is built, remained for so long a time unemployed, during which Classical fragments had become so scarce, that the builders of other churches had been put to many irregular and inelegant devices to eke out the deficiency of materials?

Then, again, how was it that a style of building was adopted in S. Lorenzo in the eighth or twelfth

century, which had in the fourth universally given place to another?

Other difficulties also arise, if we assume that the nave was so much later than the Coro, which it is impossible to enter upon here, but those who wish to consider the question fully may be referred to Ciampini, Nardini, and Nibby.

Some may be inclined to doubt the antiquity of other churches to which we have assigned the fourth century, on account of the renovations and re-decorations which they have undergone. But inthe majority of instances we cannot suppose that they were restored on newer and quite different principles of construction, since their chief members consist of fragments of undoubted Classical origin. The restorations which were effected must have been, as far as the materials are Classical, little more than readjustments of the columns, entablatures and cornices, which had suffered displacement either from age, or by some other cause.

Then, again, all the churches which date from the first half of the fourth century agree as to their method of construction, which moreover is closely allied to that of the Classical Basilicas. Now, this would not have been the case had not the old forms been adhered to in the restorations which took place. In short, we can hardly suppose that the Classical fragments, which had once been reduced to forms suitable to a particular mode of building, could have been adapted to quite another style during the process of restoration.

When, however, we find in churches claiming to be of the earliest times, material used which is not Classical, we may conclude that so far the antiquity of the building is doubtful; and, indeed, in some instances parts have been clearly modernized, as, for instance, in the churches of S. Croce in Jerusalemme; S. Giovanni in Laterano; and others.

In most of the ancient churches decorations exist which do not belong to the original buildings, such as the mosaics, which were in many cases added in the fifth or sixth century, or even later still. Also other surface decorations have been introduced; but these additions do not alter the character of the building as regards its mechanical and decorative construction.

We will now pass on to the other divisions of A.

Of Ab we have only one example, namely, the Duomo at Narni, which dates from A.D. 369.

The architecture of this building forms a transition between Aa and Ac; and soon after the above date the phase Ac became universal.

From the drawings which represent the old church of S. Pietro, Rome, we find that the walls, separating the central aisle from the inner side aisles, had colonnades supporting entablatures; while those dividing the outer side aisles from the inner had columns supporting arches; hence this church must have exhibited the modes of building classed under both Aa and Ac. It was completed about A.D. 400; so that the first important change in the construction of ecclesiastical buildings must have taken place before the beginning of the fifth century.

The churches of Ac, lists of which have been given at pages 30 and 31, for the most part belong to the period included between 400 and 600, though some were built even later; and the date given to S. M. Assunta, Isola Torcello, Venice, is even as late as 1000.

But those of late date are quite the exception, and differ from the older ones in the materials of which they are composed; for we find that the columns are in general free imitations of Classical columns; and that the massive cornice of Classical material in the ancient churches is succeeded by a slight string-course only, and occasionally by no horizontal member at all.

In ascertaining the age of the churches of Ac, we may pretty safely place those in which the Classical materials are most abundant and perfect, and the columns most regular, earliest.

Those in which the irregularity of the columnatis very great, and in which we find, from lack of Classical materials, parts made up for by rude imitations, or blocks of marble in place of capitals, and the Classical materials themselves inferior in execution, we may place later; and latest those in which no Classical material exists at all.

Ad differs from Ac principally in the form of the longitudinal arches, which are pointed instead of semicircular. When the pointed arch was first introduced into churches of A it is difficult to say. It became, however, generally used about 1200, and the churches of Ad may be included in the period comprised between 1200 and 1300.

There is reason for believing that the pointed

arch was, in a few instances, used long before it superseded the semicircular one.

Perhaps the earliest example in which we find pointed arches is the church of S. Restituta, Naples, which is a three-aisled Basilican church, with a semicircular apse placed at one extremity of the central aisle.

The columns are of Classical origin, and support pointed arches. The arcs, which determine the form of the arches, are of very slight curvature; so that the arches are not unlike that of the Etruscan gateway at Arpino, or that of the Aqueduct at Tusculum. S. Restituta dates from 650; and no mention is made that a restoration of any importance took place until the seventeenth century; which indeed can hardly be supposed to have effected a change in the arches from the semicircular to the pointed form.

We also find pointed arches in S. Maria delle Pieve, Arezzo, which dates from the beginning of the ninth century. This church was repaired in the beginning of the thirteenth century, when the four pointed arches of the crossing and the dome which they support were probably introduced. Hence it might be supposed that the longitudinal

arches of the nave were at that time altered from the semicircular to the pointed form. But this is unlikely, even supposing that it could have been accomplished without disturbing the rest of the building, because the arches of the Coro would then probably have been changed in the same manner, which was not the case. And if we suppose that changing the form of the arches required an almost entire rebuilding, the difficulties increase; for the crossing makes, with the rest of the building, a patch-work, which would not have happened had the church been entirely resonstructed at the time the crossing was erected.

We find pointed arches, also, supporting the partition walls, which divide the pairs of side aisles, in the Duomo at Pisa. This church was erected during the period included between 1064 and 1118; and no mention is made of the outer side aisles having undergone interior alterations at a subsequent time.

The churches of Ae may be placed in the fourteenth century, though it is not improbable that some of them originally belonged to Ad, and that they owe their position under Ae to the introduction of vaulting during this period. The churches of B may be said to have sprung out of those of Ac, as they differ from the latter chiefly in possessing, in place of ancient columns, cylindrical piers, at first approaching very nearly to the proportion of the Classical columns, but rapidly losing this proportion, and becoming more massive in shaft and shallow in capital.

The earliest examples are found in the north of Italy, and this mode of building is almost confined to the north, not appearing at all as far south as Rome, where the Classical materials were sufficient for the churches required, without recourse being had to imitations of them, excepting in portions only.

The only example of Ba is the oldest part of the Duomo at Monza, which dates from 595. Towards the Coro a few transverse pointed arches have been introduced, supported on pilasters, as we have already noticed at page 83. But these belong to the thirteenth century, when this church was partially reconstructed. The churches of Bb belong to the period included between the seventh and the end of the twelfth century, though probably they were most of them built in the eleventh.

About 1200 we find in B, as in A, that the round-headed arches gave place to the pointed, and the churches of Bc belong to the thirteenth century. In this century, also, we may place Bd; at least our only example, S. Francesco at Bologna, dates from 1236.

The churches of Be belong to the fourteenth century, and chiefly to the earlier half, while those of Bf were built in the latter half of the same period.

The architecture classed under C also springs out of A, and, as has been already shown in Chapter III., its origin may be traced to the introduction of rectangular masses of wall into churches of Ac, by which the rows of columns supporting the partition walls were broken up into sets.

The church of S. Maria in Cosmedin, described at page 43 as being a remarkable example of this, belongs to the end of the eighth century in its present condition; and SS. Quattro Coronati, in whose triforia rectangular piers and columns appear together, dates from 630; so that we may place the changes in the churches of Ac, which led to those of C, in the seventh and eighth centuries.

The churches of Ca may be included in the

eighth and ninth centuries; and those of Cb belong for the most part to the tenth century, and some perhaps to the eleventh. We may also place those churches in which we find transverse arches and their accompanying shafts beginning to be introduced in the eleventh century; while we assign to the churches of Cc, in which these arches generally occur, the twelfth century, referring also to the end of this century the churches of Cd.

The churches of Ce belong to the first half of the thirteenth century, and those of Cf to the latter half of the same; and, lastly, to the churches of Cg we may assign the fourteenth century.

With respect to Cf, however, we must notice the church of S. Pietro in Cielo d'oro, which dates, there can be no doubt, from a time much earlier than the thirteenth century, and it is probable that it was originally in arrangement like the churches of Cb. The vaulting, however, is of the thirteenth century, and by its introduction, and that of the accompanying shafts, this church underwent considerable alteration, so that it now strictly belongs to the style indicated by Cf.

With respect to the churches of AC, we may ascertain approximately the periods which ought

to be assigned to its three divisions, by comparing those divisions with the divisions of A and C.

Thus we may place the churches of ACa in the eighth and ninth centuries, that is, we may consider them to have been contemporaneous with the churches of Ca.

The churches of ACb may be placed side by side with those of Cb, that is, we may assign to them a place in the tenth and eleventh centuries.

The churches of ACc we may place in the twelfth century, nearly contemporaneous with those of Cc and Cd, though it is not improbable that some of them are in origin earlier than this, perhaps even contemporaneous with those of Cb, and that they received during the twelfth century the vault and vaulting shafts, which alterations entitled them to be placed under ACc.

We may give to the churches of ACd the same period as that assigned to Ce and Cf, that is to say, the thirteenth century.

Thus the churches of AC may be traced to those of C during the existence of the phase Ca, and through C their origin may be traced back to A, since the churches of C also sprang from the

main variety A, at some epoch in the period assigned to Ac.

We may conclude, therefore, that the divisions of AC extend from the eighth to the thirteenth century inclusive, so that the whole period assigned to the churches of AC is about six hundred years.

The churches of CC are few in number, and have in most cases received too many alterations and additions to enable us easily to give any general periods to its divisions.

The churches of CCa, it has been already remarked in Chapter VI., were probably in their original state of the same character as those of Cb, having received vaulting and vaulting shafts at a later time.

This time was not quite the same for all; by comparing, however, the nature and arrangement of the vaulting shafts with those of Cd, Ce, and Cf, we may ascertain it approximately.

The churches of CCb, in most instances, were built originally as they at present stand, and during the thirteenth century, as, by comparing the primary piers with those of Ce and Cf, we should be led to suppose.

They are, it will have been seen, built in a style

which naturally flows from that of CCa, and the restorations of the old churches described under CCa, and the adding to them vaulting and vaulting shafts, seem to have pointed out the style subsequently adopted in the churches of CCb.

The churches of Chapter IX., in which there are no side aisles, have not been classed, and where there are no vaulting shafts, from the decorative construction alone it would be almost impossible to ascertain the periods to which they belong.

Those examples in which we find round-headed arches and semicircular apses may, however, be placed, with probable correctness, side by side with the Basilican churches of Ac. In most of the examples given at pages 98 and 99 we find that the arches are pointed. Now this form of arch was not generally introduced before the beginning of the thirteenth century; hence we may presume that these churches do not belong to an earlier period.

The dates of some are in fact known, and belong to the first half of this century; and to this period they most likely all belong.

The same period, also, may be assigned to the

churches in the list given at page 100, at least to those in which the arches are pointed. But SS. Nicolo ed Anna, the last in the list, would seem to have belonged to an earlier period, and received the addition of transverse pointed arches during the thirteenth century: it may be said, perhaps, to date even from the tenth century.

The churches enumerated at p. 104 have all vaulting shafts, similar in construction to those of the churches placed under Ce, Cf, and Cg, and may therefore be placed in the thirteenth, and the beginning of the fourteenth century.

S. Lanfranco, one of this list, is of a very much earlier date, and the vaulting and vaulting shafts are all that belong to this period; so that this church passed through a similar transformation to that which S. Pietro in Cielo d'oro underwent.

It would be impossible in the present work to enter at length into the particular dates of all the churches we have classified. Indeed, this could not be done in many instances without arguments so long, as to invest the present treatise with a character quite different from that which is intended.

In respect of many among the examples re-

## 122 THE PHASES OF ABCHITECTURE, &c.

ferred to, the dates can be ascertained with certainty; and in these cases it will be found that they are included in the period which has been assigned them.

In other examples the dates are not so easily arrived at; but we can hardly be wrong in placing them side by side with those churches whose dates are known, and whose decorative and mechanical construction is the same; at least we may so place them, until evidence from fabric records has been obtained, sufficient to show that the places which this theory of development has assigned to them are erroneous.

## PART II.

## FAÇADES.

### CHAPTER I.

FAÇADES OF THE BASILICAN CHURCHES.

THE façade is in Italy the most important external member of the church; and not unfrequently we find ornament lavished upon it, while the rest is left quite plain, and in some cases with an appearance even of incompleteness. It is very common also to find that the façade forms a link in the chain of buildings bounding a principal street, the rest of the church being so built round, that it matters little how plain it is. In comparatively few examples do we find the whole church so isolated as to require an elaborate decoration of the whole; and even when the situation is such, rarely has advantage been taken of it, the façade having alone received especial attention, and being

consequently a work which has little connexion with the rest except that of mere contact, for the most part no continuity of ornament existing between it and the side walls.

With this mode of viewing exterior decorations, the Italians not unfrequently left the façade to be finished at a later period than the rest of the work, when another generation with new resources might complete the church with an erection vying with the interior in elaborate and costly decorations.

We cannot, therefore, judge of the age of the interior or the rest of the exterior by the façade, and we must be content to consider it quite independently of either. Indeed, the construction of the façade would necessarily be quite different from that of the partition walls of the interior, since it has another function to perform, namely, that of covering from view the extremities of the aisles, and giving to the church a proper and imposing entrance.

In churches of one aisle there are two forms of façade, either an ornamented wall, presenting a rectangular face; or a face, the summit of which follows the contour of the gable of the roof.

In churches of three or five aisles the façade is either a wall presenting a rectangular face, screening entirely the natural form in which the aisles would finish; or it has a form based upon the latter, that is to say, the central aisle is covered from view by a wall, having its summit inclined, as the gable behind it; and each side aisle is faced with a wall, whose summit is inclined equally with the roof to the horizon, and generally equally with the contiguous half of the summit of that wall which covers the central aisle, and which we shall call the central compartment of the façade.

In general the relative height of the various compartments facing the aisles depends upon that of the aisles themselves, though not always; for in some cases the summits of the side compartments are raised so as to come into the same lines as the doubly inclined summit of the central compartment.

The façades are, for the most part, constructed in one of the above ways. There exist, however, one or two exceptions, in which the outline is peculiar, differing somewhat from these.

We will now proceed to discuss the ornamentation of these façades, considering them in the order of the development of their decoration; for in their case, as in that of the interiors, we may conceive that one arrangement of the decorative members led the way to the next. As we review them, therefore, we shall look particularly for those combinations which may naturally be considered to have pointed out some new phase in the decorations of succeeding buildings; and we shall perceive that, although the members of the decorative construction of the façade have an office distinct from that fulfilled by the members of the partition walls of the interior, there is yet a strong resemblance in the mode of the development of both; and we may equally apply to the façades, as to the interiors, the principle, "That every artifice of the construction must be displayed," which manifested itself more and more completely as time went on; and of which the most important manifestation was, that in the progress of architectural development the vertical members increased in prominence, while the horizontal members became weaker, and ultimately disappeared altogether. Also, we shall find, that the façades were at first ornamented so as to hide the mechanical construction, and give little or no clue to the interior arrangements; but that, in process of time, the mechanical construction began to show itself decoratively, and finally became the basis of all ornamentation.

We shall begin with the Basilican churches, though unfortunately but few of their façades have escaped modern restorations.

The façades of these churches may be said, generally speaking, to consist of a wall, covering the central and side aisles, with no divisions whatever to indicate the positions of the aisles; and not unfrequently the ends of the side aisles are entirely screened from view by a portico, which is entered by a colonnade of Classical columns supporting an entablature, upon which the inclined roof of the portico rests its lowest boundary.

The wall covering the central aisle is ornamented only by mosaics, and a few round-headed windows, ranged at the same level; and it was not uncommon, instead of giving to the summit of this wall a double inclination to the horizon, like the gable of the roof, to make it horizontal, at the same time bending it in such a manner, that the summit considerably overhangs the base; thus partially preserving the mosaics both from rain

and sun, and presenting them more directly to the eye of a person just entering the church,

In fig. 1, Plate X., is drawn a part of the façade of SS. Vincenzo ed Anastasia, near Rome, which, though not the oldest example, as may be seen by the arrangement of the windows, is a very good type of the rest.

As other examples, we may mention the façades of S. Lorenzo fuori le mura; S. Giorgio in Velabro; SS. Giovanni e Paolo, and S. Cecilia, Rome: the latter, however, has been very considerably modernized.

It will be noticed in fig. 1, that the roof of the portico rests on arches of small curvature, so as to throw its weight directly upon the columns, and preserve the entablature from the danger of breaking; this construction, it will be remembered, was adopted in the partition walls of the interiors. We are not without examples in which these arches of small curvature are used decoratively without any entablature, blocks of marble being inserted between the spring of the arches and the capitals of the columns; namely, the portico of S. Sabina, Rome, and that of S. Maria Impensole (?), Narni. In most of the above cases

the portico is covered internally by a wooden roof, similarly constructed to those covering the side aisles. In S. Sabina, however, we find Roman vaulting, the extremities of the semicylinders being hidden from view. In the portico of S. Stefano Rotondo, the transverse semicylinders alter the decorative construction, their extremities being revealed, so as to present to the eye an arcade of nearly semicircular arches springing from the columns.

The same arrangement may be seen in the portico of S. Maria in Trastevere, and there are others, also, which might be instanced, but they have been so much modernized, that it is difficult to say what is old in their construction, and what is new. The portico drawn in fig. 2, Plate X., will give us a fair idea of the kind we have just described, except that in these the arches are of equal radii.

In the spoliation of the Classical buildings a large number of very small columns was found, which were never used to any great extent in the interiors, except, perhaps, in a few of the later triforia; they were, however, lavished upon the exterior decorations, as we shall now see.

The earliest mode of using these columns was to cover the whole façade with galleries one above another, presenting to the eye arcades of semicircular arches resting upon the columns, which stand upon a corbel table a little above the vertices of the arches of the arcade below. These gallery-arcades, in a decorative point of view, are exactly like the portico reduced to a smaller scale; see fig. 2, Plate X., which is a sketch of the façade of the Duomo at Pistoïa, and a good example of the kind we are considering. In this instance it will be noticed that the portico projects beyond the plane of the upper arcades, as it does from the wall of the earlier façades. In the façade of the Duomo at Lucca, however, we find the arcade of the portico in the same plane with the gallery-arcades, and it may be remarked, by the way, that the arches of the portico in this instance rest, not on single columns, but on compound piers with semi-columns set against the exterior faces, and nook-shafts in the adjoining nooks.

In the following examples a proper portico does not exist, but the arches of the lowest arcade stand against the wall, forming what we shall call a panel-arcade, that is, a series of panels with arched heads, the vertical members which divide the panels being in general semi-columns attached to the wall, as in fig. 3, Plate X. They are S. Maria delle Pieve, Arezzo; S. Michele, and S. M. Forisportam, Lucca; and the Duomo at Pisa.

Also, S. Andrea, S. Pietro, and S. Paolo, Pistoïa; S. Cristofero, Lucca; and S. Caterina, Pisa, are examples of the same kind; but the latter are all re-decorated in a later style as to certain parts.

S. Paolo, for instance, has in the two upper stories arches slightly pointed and multifoiled in place of semicircular ones. S. Caterina has also undergone similar modifications, and it has for the vertical divisions of the panel-arcade rectangular blocks instead of columns. The alterations in the other three churches were effected, not by modifications of what already existed, but by the entire reconstruction of the decorations of certain parts.

In S. M. delle Pieve the façade is rectangular in form, and is divided into stories by corbel tables, the upper gallery presenting to us a colonnade of ancient fragments (including a Caryatid), supporting

the cornice, without the intervention of arches. This example is curious, and differs from some of the others, in that the intercolumniations in the different stories are unequal; there are, in fact, thirty-two columns in the colonnade of the highest story, twenty-six in the arcade next below, fourteen in the arcade under this, and then the panel-arcade of five arched panels. Thus the columns do not fall into the same vertical lines.

Also, it may be remarked, that the vertical divisions of the arched panels are semi-compound piers, as if we had reduced the arcade of the portico of the Duomo at Lucca to a panel-arcade.

In those instances in which the summits of the central and side compartments are inclined to the horizon, the centres of the arches, in the highest arcades, lie in lines parallel to the summit, or columns without arches directly support the highest cornice; in both cases the columns stand upon horizontal corbel tables, and therefore vary in height, according to their position.

Within the portico, where this exists, the church is entered by rectangular doors, in number equal to that of the aisles, the lintel and door-posts being in general constructed, as in the earliest churches, of Classical bits of frieze or cornice, frequently of very irregular lengths and incongruous ornament. The wall within the upper arcades is pierced with round-headed windows, or circular lights, and rectangular doors, communicating with the external galleries.

In cases where the portico has been reduced to a panel-arcade, we sometimes find that the doors which enter the aisles are surmounted by an arched panel, the head of which is in one or two instances stilted; see figs. 3 and 4, Plate X. In some cases the head of this panel is concentric with that of the compartment of the panel-arcade in which the door is placed, and is frequently filled with mosaics or a fresco painting.

Before proceeding with the general history of façade development, it will be well to consider the façade of S. Mark's church, Venice, in order that we may see in what position it stands with respect to the rest as regards the phases of ornamentation. Although unique, this façade is not altogether dissimilar from some of those before described. The basement story is constructed of an arcade of round-headed arches, resting on piers of rectilinear plan, and so far it does not differ in kind

from that of the Duomo at Lucca, or the panelarcade of S. M. delle Pieve, Arezzo. The arches of this arcade, however, instead of opening directly into the portico, as in Lucca, form the entrances of semi-domical recesses, pierced by the doorways, through which access is gained to the portico.

The central arch is of greater diameter than the rest, like that of the portico belonging to the Duomo at Pistoïa, but so much so as to break the horizontal summit of this story.

Instead of placing the small columns in gallery-arcades above, they placed them against the piers of the recesses in a purely decorative manner, so as to form two belts, the one standing on a corbel table supported by the other. The belts are bent into the recesses, being broken only by the doorways, and the round-headed panels which surmount them. Above the basement story rises another story set back a little, and constructed quite similarly to it, except that the arches do not enter semi-domical recesses, but form panels.

We may consider, therefore, that there is no feature in the façade of S. Mark's unknown in the Pisan churches, except it be the use externally of semi-domical recesses, and the peculiar arrange-

ment of the columns. But the latter is a purely decorative feature; and many of the columns have no more connexion with the building than a statue has with its niche,—a treatment partly to be accounted for from the fact that the columns were offerings made at different times, and were attached to the façade to enrich it by their rare costliness. Indeed, the construction of the building shows that the introduction of many of them was not even taken into account at the period of its erection.

We have remarked that in some of the foregoing façades the portico became reduced to a panel-arcade, while the stories above were ornamented by gallery-arcades. Now it is interesting to find that the gallery-arcades also became reduced to panel-arcades, in a manner precisely similar to the reduction of the portico, in the church of S. Giovanni, Pistoïa; see fig. 4, Plate X.

From this point we shall have to follow two different modes of ornamentation, so that it will be well to pause first, in order that we may briefly consider the position we have arrived at in the development of façade decoration, especially as regards the disposition of the vertical and

horizontal members. In the first place, all deep recesses, such as the galleries for instance, have gone, and the decorative members have become attached to the wall of the facade. Thus we have stringcourses or corbel tables dividing the façade into numerous stories, and these are all ornamented alike by a row of panels with arched heads. These panel-arcades form prominent horizontal members, since in every story any one panel is the counterpart of another, the eye ranging from one side of the story to the other without meeting with any thing to interrupt the continuity of ornament. At the same time, no system of vertical members has yet been formed, were tical lines presented by the columns coming at intervals which in general do not in the different stories fall together so as to produce regular vertical lines from the top to the bottom.

We shall now find that the horizontal decorative system becomes weakened in the one case by the uniformity of the members which are arranged in the same story being destroyed; in the other, by the almost entirely dropping the panel ornamentation, so that string-courses or corbel tables form the only continous horizontal members.

In the first case, which we shall consider in the next chapter, the vertical system gradually completed itself, as architecture developed, by the horizontal divisions dying out, leaving room for the vertical divisions of the panels to extend themselves from the summit of the façade to the ground.

In the second, new vertical members were introduced in the form of buttresses and buttress-pilasters, which, as they became more and more complete, chased away, so to say, the string-courses and corbel tables.

We shall also find a third method of ornamentation, which is a composition of the above two, consisting, that is to say, of panels and buttresses used in combination. In this the horizontal and vertical members passed through the same transformations as in the primary varieties from which it was formed.

## CHAPTER II.

# FAÇADES WITH PANEL DECORATIONS.

THE ancient Classical columns which we have hitherto found so copiously used in gallery and panel-arcades became scarce as time went on; and as a great part of their beauty of effect was owing to the variedly coloured antique marbles of which they consisted, where these could not be had we should naturally expect to find the panel-arcades limited to portions of the façade only; other parts being ornamented merely by string-courses or the corbel tables on which the semi-columns formerly stood, and also by a few circular and round-headed windows, which before existed under the shade thrown by the deep galleries. Thus in S. Frediano, Pisa, drawn in fig. 5, Plate X., and in S. Pietro Toscanella, a part of which is represented in fig. 1, Plate XI., we find portions without panelling, and where the panels exist, as in the lower story of S. Frediano, and in the side compartments of S. Pietro, some of the columns are wanting, their places being supplied by corbels.

These facades show us, therefore, the modes of ornamentation which will be treated of both in this chapter and in the next; and the kind of panelling, which decorates the façades we are at present proceeding to consider, is easily suggested by the broken panel-arcade of either S. Frediano or S. Pietro. It may be described in the following way. The head of each panel is formed of a number of small arches resting on corbels, and the vertical divisions of the panels are in the form of very attenuated semi-columns, or, as we may call them, semi-columnettes. A panel of this kind we shall name, on account of the row of arches forming its head, an archiolated panel. It differs from that exhibited in the above-mentioned façades only in the increased number of the arches which form its head, and in the vertical divisions being semi-columnettes instead of semi-columns. This form of panel, though most frequently used, was afterwards followed by other forms, and in particular we may mention archiolated panels aring no corbels at the spring of the little arches, and ribbon-pilasters in place of semi-columnettes; so that the panel might be described as formed by the cutting of a lamina of stone, the incisions being made always perpendicular to its surface, and the lamina so cut being placed against a plane surface. The first kind of archiolated panel may be seen by meterring to the upper story of the façade drawn in fig. 6, Plate X., and also to fig. 7, in which, just under the wheel-window, we have the second kind as There are cases also of double panelling, that is, such as may be said to be formed of two laminæ differently cut and placed in contact, yet so that neither of them hide the incisions of the other, the under lamina being set against a plane surface; as may be seen, for example, in fig. 8, Plate X.

In the earliest examples of the façades which are ornamented by archiolated panels, we continue to find the horizontal corbel tables on which the bases of the columnettes are made to stand; at the same time these continuous horizontal members are much rarer in them than in the façades treated of in Chapter I., and they are seldom

found crossing both the side and central compartments together. One of the most complete examples is the façade of S. Zenone, Verona; of which there is a sketch in fig. 7, Plate X. Here two small prismatic buttresses indicate the positions of the partition walls of the interior, but these as well as the two pilaster buttresses bounding the side compartments were added later, and cannot be considered as portions of the original design. The upper part of S. Sofia at Padua, which is represented in fig. 6, Plate X., and the façades of S. Ambrogio, Milan, and of the Duomo at Verona, are decorated with archiolated panels, and show us the same phase in architectural development as S. Zenone.

Although we are, strictly speaking, examining façades, yet, as a proper façade is not possible in circular churches, we may in place of it consider in them the decoration of the whole exterior. Thus we may notice together with these façades that portion of S. Tomaso in limine, Bergamo, which bounds the aisle and gallery above, on account of the similarity of its decorations to theirs. The upper part of this church which encloses the dome is also ornamented with archiolated panels,

smong the façades of this chapter, in which case it enables us to illustrate the latest phase in panel decoration, in which all the vertical members are complete and continuous, the horizontal members having no existence at all.

### CHAPTER III.

#### INTRODUCTION OF BUTTRESSES.

In Chapter II. we have already referred to the façades of S. Frediano, Pisa, and S. Maria, Toscanella, as examples in which we find the mode of decoration by archiolated panels indicated; and in which also we see parts ornamented chiefly by string-courses, and a few windows, or groups of windows, which forms the chief peculiarity in the most ancient of the façades we are about to consider in this chapter.

Fig. 1, Plate XI., represents half of the façade of S. Maria, Toscanella; to the central compartment of which we especially refer.

Fig. 2, in the same plate, is a part of the Duomo at Fiorentino, which is a still more complete example of this method of ornamentation. Among façades of this kind we may name also that of the old Duomo at Pavia; also the façades of the

Duomo at Cremona; S. Chiara, S. Apollinare, and S. Francesco, Assisi; S. M. Assunta, Perugia; and, lastly, the façade of S. Fermo, Verona, exclusive of the buttresses which were added later.

In the façade of the Duomo at Corneto, drawn in fig. 3, Plate XI., there are four buttress-pilasters, two of which bound the façade, the other two marking the positions of the partition walls of the interior.

It will be noticed that the buttress-pilasters, in this instance, only rise to the top of the basement story, where they support a corbel table. In the façade of S. Francesco, Gubbio, represented in fig. 4, Plate XI., the buttress-pilasters, although as yet imperfect, extend above this; and the corbel table does not destroy the continuity of the vertical members, but passes round them. The façade of the Duomo at Spoleto is another example in the same stage of architectural development.

In the Duomo at Gubbio we find the buttresspilasters perfected, extending from the ground to the highest cornice, but, at the same time, they are crossed by the continuous horizontal members.

In the following examples the buttress-pilasters

intercept the passage of the string-courses, which, moreover, do not always extend across each of the compartments into which the vertical members divide the façade. They are, S. Francesco, Brescia, drawn in fig. 5, Plate XI.; S. Marco, Milan; the Duomo at Piacenza; S. Frediano, Lucca; the Duomo at Genoa; and S. Michele, Pavia. last mentioned is peculiar, in that the vertical members are in the form of the half of a singlenooked pier, with nook-shafts, and the horizontal members are bands of sculpture, extending between these semi-piers. Besides these there are, S. Pietro, Pistoïa, which is a more ancient façade, partially re-decorated in this style; and S. Francesco, Pavia, originally built in this style, and re-decorated partly in one still later.

At this point we find that the horizontal stringcourses, &c., disappear entirely, the buttresses rising from the ground to the cornice, generally in the form of pilasters, and rarely with any abutments or horizontal divisions. The parts between the buttresses are ornamented by windows, piercings, and isolated patches of ornament, each patch forming a separate design, and having no relation to any neighbouring one. For example, the façade of the Duomo at Borgo San Sepolcro has been almost entirely re-decorated in this style. Also, S. Francesco, Bologna; SS. Nicolo ed Anna, near Bergamo; and S. Maria delle Grazie, Milan, are examples. Then again, S. Domenico, Arezzo, though originally belonging to an older style, has been re-decorated in this. In all the above instances the buttresses stop short at the cornice, which decoratively rests upon them; but in the following façades they pierce through the cornice, and finish in pinnacles, or, at least, are prepared to receive them: S. Giacomo, Bologna; S. Zeno, Oratorio (redecorated in this style), Verona; S. M. dei Frari, S. Maria dell' Orto, SS. Giovanni e Paolo (redecorated in this style), S. Stefano, and S. Giovanni in Bragola, Venice; S. Maria del Carmine, Pavia; S. Tomaso, and a small portion of the façade of the Duomo, Verona; S. Agostino, Bergamo; the Duomo at Como; and the Duomo at Monza.

The following façades have been partially redecorated in this style: S. M. del Carmine, Brescia; the Duomo at Modena; S. Agostino, Genoa; the Duomo at Sarzana; the Duomo, Pietra Santa; and the Duomo at Prato. Also, the upper parts of S. Cristofero, Lucca; and the Duomo at Vicenza

have been similarly re-decorated. Of these examples, S. Stefano, Venice, will give us a good idea of the rest: it has, therefore, been drawn in fig. 6, Plate XI.

In the majority of these examples the cornice at the summits of the compartments rests upon a series of little arches wrought in relief against Such a cornice may be called an archiolated cornice, and may be considered as derived from the archiolated panel. It may be observed with respect to the archiolations, that we find the arches sometimes semicircular, and sometimes pointed; frequently, also, in addition to a series of arches of either of the above forms, we find a second series intersecting the former. single series, the arches are sometimes foiled; and in the double series, the pointed arches which form the intersections are foiled also. With respect to the disposition of the arches, when the archiolated cornice is inclined to the horizon, we find, that they are either placed with their altitudes vertical, or at right angles to the direction in which the cornice lies.

In the above examples, the buttresses are in general so placed as to bound the façade, and

sho to mark the positions of the partition walls of the interiors; so that we can determine, without entering the church, whether it have one, three, or five aisles. The only exception is SS. Nicolo ed Anna, near Bergamo, where an additional pair of buttress-pilasters points to internal divisions which do not exist.

### CHAPTER IV.

# FAÇADES ORNAMENTED WITH PANELLING AND BUTTRESSES.

WE have now completed our investigation of the two distinct methods of façade decorations suggested by S. Frediano, Pisa, and S. Maria, Toscanella; we will therefore proceed to the third, in which these two modes are found in combina-Possibly some of the façades to be brought under our notice, in their original state, may have belonged to those which we have considered in Chapter II., and may have been restored with the addition of buttresses at a later time. This cannot, however, be said of the majority, since the panelling is often modified to give them In the examples of pure panel decoration given in Chapter II. the horizontal stringcourses were retained to the last, although they were but sparingly used in these when compared with

the façades of Chapter I. In the examples we are at present about to treat of, we find a few instances in which the horizontal members have totally disappeared, permitting the vertical members, in the shape of buttress-pilasters and semi-columnettes, to rise unbroken from the ground to the summit of the façade, or nearly so.

Before we proceed to those buttressed façades which were ornamented by archiolated panels, we must turn back to one remarkable façade decorated with gallery-arcades, and a panel-arcade, having also complete buttresses.

This is the façade of the Duomo at Ferrara; it consists of three nearly equal gables, each bounded by buttresses, which are, however, broken by the string-courses which cross the gables, and in some places also by bands of small columns forming links, which connect the gallery-arcades of one gable with those of another, and become parts in the series of grouped columns on which the deeply-moulded arches rest. In the churches at Pisa and the neighbourhood decorated with gallery-arcades, the arches, on the contrary, rest on single columns, with one or two exceptions,

in which we find a group of four columns supporting at the extreme limits of the façade the first and last arch of the gallery-arcade. In Ferrara these groups, or rather belts of columns lying in nooks, were not improbably suggested by the belts of columns similarly situated in the façade of S. Mark's, Venice, which we have described in Chapter I.

Another peculiarity wherein this façade differs from the Pisan examples is the arrangement of the highest arcade, the arches of which lie under the cornice of the gable. In Pisa we found the columns of this arcade standing upon a horizontal corbel table, and, consequently, varying in height in proportion to the inclination of the summit line to the horizon. In Ferrara the columns are of uniform height, and stand upon steps which ascend and descend with the summit of the gable. We shall call these step-arcades, in order to distinguish them from the gallery-arcades. façade at Ferrara is also unique, in that broken vertical lines are presented to the eye by the insertion here and there of groups of columns, with their bases resting on those from which the arches of the arcades spring; their capitals in a

decurative sense supporting the corbel table on which the arcade above rests.

Having thus pointed out the features which are peculiar to this façade, we will now turn our attention to buttressed façades with archiolated panels.

The Duomo at Novara is a good example of this, the vertical divisions of the panels being partly pilasters and partly semi-columnattee.

San Pietro in Cielo d'oro, Pavia, is another example with only one corbel table, and this is broken in continuity by the buttresses; see fig. 7, Plate XI. San Lanfranco, near Pavia, is an instance in which we find the horizontal members discontinued over parts of the façade; see fig. 8, Plate XI. In the façade of S. Abbondio, Como, drawn in fig. 9, and in that of S. Primo, Pavia, we find no horizontal divisions at all, the buttresses and semi-columnettes of the panels extending from the summit to the ground.

In the Pavian examples just mentioned there are round-headed windows placed in groups, the apertures being separated by columns; and those nearest to the summit have the centres of their arched heads in lines parallel to the cornices, the

columns resting on steps; so that they are not unlike the step-arcades spoken of in the description we gave of the façade at Ferrara. In S. Primo they are placed so as to form an almost continuous arcade, broken only by the columnettes which divide the panels, the central compartment containing a group of nine apertures. S. Maria, in Borgo Ticino, Pavia, is another example of this mode of façade decoration.

In the following examples we find that the columnettes are changed for pilasters, and that the archiolated panel has become less common, panels with simple arched heads sometimes taking its place: namely, the façade of the Duomo at Torcello; also, that of Murano, drawn in fig. 8, Plate X., which, on account of the insignificance of its buttresses, we have already noticed in our last chapter.

S. Andrea, Venice, is another example possessing archiolated panels, the centres of the arches lying in curved lines, which follow to some extent the bent outline of the summit.

There are also the façades of S. Agostino, Rimini; S. Marcello, Vicenza; and S. Maria della Corona, in the same city, in which instance, it may be

noticed, that the buttresses themselves are cut by long panels extending to the ground. Lastly, there are the façades of S. Gregorio, and S. Mariadella. Carità, Venice; the latter of which is represented in fig. 9, Plate X. In both these the heads of the panels are pointed and archiolated.

Before concluding this chapter we must consider two well-known façades, namely, those of Orvieto and Siena. Each has been the work of many centuries, and therefore presents to us a conglemerate, difficult of arrangement with the other façades.

In this respect they are not good examples from which to form our ideas of Italian façades in general; yet, if carefully considered, we may find in them, piecemeal, decorations belonging to almost all the phases through which architecture passed.

In both there are buttresses, string-courses, panellings, and arcades, not unlike the gallery-arcades, only that in these examples they are little more than ornamental features.

In Siena an old panel-arcade remains in the lowest story, the divisions between each panel being semicompound piers of a somewhat more complicated form than any we have as yet seen used externally. Above this panel-arcade, in which is placed the three principal entrances to the church, we find buttresses and string-courses, &c., used together in a way which shows that hesitation was manifested as to which should form the most prominent features; sometimes the vertical members, and sometimes the horizontal becoming subservient the one to the other.

In the façade of the Duomo at Orvieto the vertical members have clearly gained ascendency over the horizontal, but the latter have not yet been discarded.

These façades both stand out from the rest in their elaborate ornamentation, and in the multiplicity of parts in all their members; such as the many divisions and subdivisions of the panels, the rich congeries of mouldings and string-courses.

In Italian architecture generally the simplicity of the various members is a marked characteristic, the beauty of effect being left to colour and harmonious proportion, where in churches north of the Alps it would have been obtained by the strong lines of shadow formed by the deeply-cut members, and by ornamentations in different planes.

We frequently find in Italy, it is true, ornament

# 158 Pagadus ornamented with Panikang, &c.

preduced by incisions, as well as more surface decorations, such as colouring and mosaics; but it may be said in such cases that the stones used in the building are ornamental, rather than that the ornament forms a part of the main design. This was literally true of some of the older churches where stones belonging to the different members of Classical buildings were used with their ornamented faces placed in view, and arranged in as symmetrical a manner as could be improvised at the time; and it may account for the character of the ornamentation which, when Classical fragments were no longer to be obtained, was adopted in the later Italian façades.

#### CHAPTER V.

# CLASSIFICATION OF FAÇADES.

It will be useful to arrange in order the steps by which it is here conceived the ornamentation of façades developed.

In so doing we shall follow a method analogous to the one adopted in the case of interiors, distinguishing in the façades three varieties indicated by the letters A, B, C, and a fourth BC, which may be called a composite style, partaking of the nature of both B and C.

By A will be noted that variety of architecture which includes such façades as present to us a surface unornamented except by mosaics and a few piercings, and which possess porticoes, entered by colonnades of Classical columns, supporting either entablatures or arches. This variety will include also those façades which are ornamented by stories of gallery or panel-arcades, ranged above the

porticoes, which they resemble when considered in a decorative point of view.

Under B will be included façades, ornamented chiefly by archiolated panels, and other panels, of the kind described in Chapter II.

The variety under C includes façades chiefly distinguished by their prominent buttresses and buttress-pilasters; and that under BC includes those façades which are ornamented by buttresses, and also by panels of the kind appearing in the variety B.

Each of these varieties may be subdivided; and we shall use the small letters of the alphabet for this purpose, making them indicate the main steps in their development.

Thus of the variety A we may note six principal phases in its decorations:

a, in which the columns of the portice support an entablature.

b, in which arches, whose form is determined by an arc of a circle less than a semicircle, rest upon the columns.

c, in which the columns support semicircular arches, or the same stilted.

d, in which, in addition to the portico, there are stories of gallery-arcades.

e, in which both the portico and gallery-arcades assume the form of panel-arcades.

f, in which the regularity of the panel-arcade is impaired, the panels taking that form which suggested the kind of panelling used in B; and in which parts of the façade appear without panels, string-courses or corbel tables alone remaining, thus suggesting the kind of ornamentation adopted in the variety C.

Of the variety B we may note three phases:

a, in which the panels are divided vertically by columnettes.

b, in which in place of columnettes we find ribbon-pilasters.

The façades of both a and b are divided into stories by means of corbel tables or string-courses, though the divisions are fewer than we find in Ad and Ae.

c, in which the façades have no horizontal divisions at all, the vertical divisions of the panels extending from the ground to the summit of the façade, or nearly so.

C has four principal phases:

a, in which the buttresses are generally imperfect, the façade being divided horizontally by string-courses, or corbel tables, which cross over the buttresses.

b, in which the buttresses extend from the ground to the summit, the horizontal members having lost their continuity, so that they only cross the façade in parts, and never pass over the buttresses.

entirely disappeared, the buttresses being the only prominent members in the façade.

the cornice of the summit, now pierce through it, and support pinnacles.

In BC may be placed three subdivisions, indicating the principal phases through which this variety passed.

a, in which the panels are separated by columnettes, as in Ba.

b, in which they are separated by ribbon-pilasters, as in Bb.

The façades of a and b are divided in general into two or more stories, by means of string-courses, or corbel tables. It should be remarked, also, that as we pass from a to b, the buttresses become more perfect, just as

in passing from Ca to Cb in the case of the variety C.

c, in which the ribbon-pilasters, which divide the panels vertically, run parallel to the buttresses from the summit of the façade to the ground, or nearly so.

# CHAPTER VI.

# THE PHASES OF FAÇADE DECORATIONS VIEWED . CHRONOLOGICALLY.

WE intend, in this chapter, to assign periods to the different phases of architecture classified in the last. The difficulties in the way of arriving at certainty in respect of dates are greater in the case of façades than in that of interiors; and this because, as was remarked in Chapter I., Part II., the facades were sometimes left to be completed decoratively many years after the rest of the church was built; and also on account of the subordinate position of the façade in the building considered with reference to the interior, which made it of less importance to preserve its Hence, the periods given to the different phases of façade decoration, classified in Chapter V., must be looked upon rather as approximations, which at a future time a more careful investigation

THE PHASES OF FAÇADE DECORATIONS, &c. 165
of the records and traditions which bear upon
each particular church may reduce to their precise
limits.

If we turn to the last chapter, we shall see that the chief varieties of façade decoration are three in number, A, B, and C; and that B and C both branch off from A during its last phase, that is, probably in the eleventh century.

We may therefore give to the variety A, a period comprised between and including the fourth and the eleventh centuries, assigning both to B and C, and also the composite style BC, a period extending from the eleventh to the end of the fourteenth century.

Let us now turn to the subdivisions of A.

We can hardly be wrong in supposing that the earliest form of the façades of A, indicated by Aa, existed contemporaneously with that arrangement of the interior partition walls in which there is a colonnade of Classical columns supporting an entablature. At the same time, there seems little doubt that in one or two instances, the kind of portico which distinguishes the façades under Aa was used exteriorly, long after the interior changes had been made by introducing decorative arches

in place of the entablature for the support of the partition walls.

Perhaps, however, in these instances there may have been restorations which would account for the continuation of this phase, for in other instances we find portices in which the colourade takes the successive forms which were pointed out in the case of the partition walls, and which we have in the last chapter indicated by Ab and Ac. Taking Ab as a transient phase, leading rapidly from Aa to Ac, as in the interiors, we may place the phase Ao in the period commencing with the lifth and ending with the eighth century.

The decorations by means of gallery-excedes began to be used probably as early as the ninth century, if not before; so that to the phase Ad we may assign the ninth, and perhaps part of the tenth century, placing towards the end of the latter the phase Ae, and finally assigning to Af (the point of departure of B, C, and BC) the eleventh century.

To Ba, the first subdivision of B, we may assign the twelfth century, to Bb the thirteenth, and, lastly, to Bc the fourteenth century.

With regard to C, we may assign to its first

phase, Ca, the twelfth century; to its second, Cb, the thirteenth; to its third, Ca, the fourteenth; and towards the end of this century, and during the beginning of the next, we may place its last phase, Cd, which forms the point of contact with the Renaissance, an architecture beyond the limit of the period which we have proposed for investigation.

The three subdivisions of BC were respectively contemporaneous with those of both B and C, that is, BCa, BCb, and BCc, successively belong to the twelfth, thirteenth, and fourteenth century.

## PART III.

## TOWERS

## CHAPTER L

TOWERS OF THE BASILICAE CHURCHES.

Ir would seem that but little attention has been paid to the Campaniles of Italy in the description of the Architecture of that country.

Certainly the towers do not offer so much metter for interesting investigation as the interiors and façades. Notwithstanding this, they are objects worthy of particular attention, as supplying us with intermediate phases in the development of certain kinds of ornamentation which were not so distinctly assumed in the decorations of the façades.

We shall pass under review many of the towers of Italy, afterwards classifying them according to the different peculiarities in their ornamentation, so that we may be able the better to trace in them that contest between the vertical and horizontal members, which they exhibit no less than the interiors and façades.

In Italy a church has generally only a single campanile. It is extremely rare to find a group of towers such as occurs so frequently on the Rhine, or even the moderate number of two or three, of which England and France present to us so many examples.

The campanile stands either placed in contact with the exterior wall of the side aisle, or at a little distance from it, or else it rises over one of the compartments of the side aisles. Whatever be its position, it is rarely made to combine and form one design, either with the façade or any other exterior member. Perhaps the only exceptions of any importance are the Duomo at Genoa; S. Andrea, Vercelli; and S. Antonio, Padua.

Of the first, only one of the two towers is completed, but both stand so as to form parts of the façade in a manner similar to that seen in many churches north of the Alps.

It may be considered that this independency of the campanile detracts from the grandeur of the church considered at que mass; and this must be admitted, though the church with its detached campanile forms a most picturesque object, especially when the group is completed by the addition of a baptistery.

The fewness also of the towers in Italian churches compared with what we see in other countries, and in some cases the entire absence of them, takes away from that majesty which, on account of their great dimensions, so many of the Italian churches would otherwise have. Msny an ordinary church, which in magnitude would rank side by side and even exceed that of an English Cathedral in every thing, except, perhaps, in length, is passed by with little concern, as it lies partly hidden by the lofty palaces of the narrow streets. Had these churches been built with pairs of towers attached to their façades, and lantern towers over the crossings, the distant view of an Italian town, striking as it is, would have been surpassingly grand.

In S. Maria delle Pieve, at Arezzo, the campanile stands on the last compartment of one of the side aisles, and rises just behind the façade, which is therefore in the general outline very similar to that of the Duomo at Genoa; but the tower forms no part in the design of the façade, which crosses its basement story after the manner of a screen.

The towers we propose to discuss are in plan circles, or rectangles, the latter being in general square; in one or two instances, however, the plans are in the form of irregular quadrilaterals. Whichever of these forms was used, we find that similar methods of ornamentation were adopted; and similar changes took place in the disposition of the decorative members as architecture developed; so that we shall investigate them side by side.

It would seem that in the earliest towers there were no horizontal divisions by means of corbel tables or string-courses at all, but that the surfaces were simply pierced by apertures forming single lights, or pairs, or groups of three or more lights; each aperture in a particular group being divided from its neighbour by means of a column on whose capital the arched heads of the apertures were supported. But in somewhat later examples, in place of columns we find that rectangular blocks of wall form the divisions between the apertures.

Of the earliest towers, those of SS. Quattro Coronati, and S. Eustachio, Rome; and S. M. in porto fueri, S. Giovanni Evangelista, and Il torre del Pubblico, Ravenna, are examples. those are in plan rectangles. There are examples also among the round towers; for instance, that of the Duomo at Città di Castello; also those of S. Apollinare in classe, and S. Apollinare nuovo, Ravenna; the latter has been drawn in fig. 1, Plate XII. In the round tower of the Besilica Orsiana, Ravenna, represented in fig. 2 of the same Plate, there is a well-defined string-course dividing the tower into two stories. It seems probable, however, that this tower was originally similar to that in fig. 1; and that the part from the string-course upwards belongs in its decorations to a somewhat later time. The tower of S. Giovanni Battista, also in Ravenna, gives us an instance where regular divisions into stories by means of prominent string-courses are to be found; see fig. 3, Plate XII.

Of square towers so divided, we find a large number in Rome, and a few in other places as well. The Roman ones are S. Pudentiana; S. Giorgio in Velabro; S. M. in Cosmedin; S. M. in Trastevere; S. Cecilia, and S. Bartolommeo. To these we may add the towers of the Duomo at Pistoïa; and S. Scholastica, Subiaco. In some of the above examples the divisions between the apertures are rectangular blocks instead of columns, at least in the lowest of the shallow stories, which, as in fig. 4, stand upon the deep basement story; and in a few instances the apertures are closed, so as to form panels. There is one tower, namely that of S. Lorenzo fuori le mura, Rome, where there are no columns at all, the divisions between the lights in every story being effected by means of rectangular blocks.

Thus, we have both in square and round towers arrived at that point where we find frequent horizontal divisions in the shape of string-courses or corbel tables, and groups of windows in each story, the apertures being separated either by columns or rectangular blocks. In most of the square towers the four sides of every story contain each a group of lights, so that we get in them arcades of open arches, something like the gallery-arcades of the façades, resting on columns which would form a continuous belt were it not for the corner blocks. In the tower of the Duomo at

#### CHAPTER IL

DECORATIONS BY MEANS OF ARCHIOLATED PARELS.

The probable origin of the archiolated panel has already been pointed out in the Part relating to façades. We might easily, however, and perhaps more naturally, suppose it to have been first brought into existence by the blocking up, after the removal of the columns, of grouped windows, such as those represented in fig. 1, Plate XII. We see this done, for example, in the second story of the tower, drawn in fig. 2 of the same Plate.

The tower of the Duomo at Lucca exhibits completely the panel system of ornamentation. In this tower there are six stories, including the basement story, and these are divided the one from the other by string-courses. Each story is decorated by an archiolated panel, and the windows are so arranged, that a group of four apertures stands in each of the two upper stories, a group

of three, and then of two apertures in the next two stories in the order of descent, and, finally, the fifth story and basement have each a single light.

The tower of S. Michele, in the same city, has a somewhat similar arrangement; but here the groups of lights are broken by rectangular blocks in the second and third stories; and in the fourth and fifth the archiolated panels are divided vertically by ribbon-pilasters into sets of three panels each; see fig. 1, Plate XIII.

The tower of the Duomo at Asti is another example of panel decoration, there being two panels divided from each other by a ribbon-pilaster in each story, with single lights in every panel.

Besides these we may mention the tower of S. Nicolo at Pisa, which, with the exception of one story ornamented by a gallery-arcade, is an example of panel decoration. It has the highest story of eight sides ornamented by archiolated panels, and the next, of sixteen sides, forming an arcade of arches, which rest on columns, and finally the deep basement story of eight sides, each containing a long arched panel. Also, there are the towers of S. Lorenzo, and La Madonna della

Corona, Vicenza; the Duomo, and S. Chiara, Assisi; S. Agestino, Genea, and the tower of the Duomo at Bologna. The latter is interesting, an account of the differences in the radii of the archie of the upper archiolated panel; and also because of the double panelling of the basettent story.

The tower of the Duomo at Assisi is likewise peculiar in the arrangement of the archiefeted panels; since the radii of their archies are not the same in all the stories, and the divisions of the panels in the different stories do not fall into the same vertical lines.

In all the above examples the divisions of the stories are marked not only by the panelling, but by string-courses as well. The latter now disappear, the horizontal divisions being effected solely by panelling, and more sparingly than here-tofore; for we find the panels extending over spaces pierced by two or more groups of windows arranged one under the other. This may be seen in the tower of S. Frediano, Lucca, represented in fig. 2, Plate XIII. Also, as examples of panelled towers, without string-courses, there are those of the Duomo at Modena, and S. Maria, Toscanella; then, again, those of S. M. Assunta, Isola Torcello;

and S. Nicolo, Venice. In the two last named there is a single group of lights at the summit, and below this two long archiolated panels, extending nearly to the ground. Finally, the tower of S. Francesco, Ravenna (see fig. 3, Plate XIII.), is an instance in which no horizontal divisions occur at all, but double panelling extends nearly from the summit to the ground, so as to include all the windows and piercings.

Although in the above instances, and probably in many others also, the string-courses were dropt, yet in some a single one was retained, which divided the tower into two stories, the highest containing the only group of lights, and the basement story being ornamented by long panels; such, for example, are the towers of the Duomo at Piacenza; SS. Pietro e Caterina, Isola Masorbo; and the modernized tower of S. Mark's, Venice.

Thus we see that, in the case of panel decoration, the horizontal divisions were at first very prominent, being effected not only by the panelling, but also by means of corbel tables or string-courses; and that after a time the string-courses were in general dropt, the horizontal divisions being confined to panelling only, and becoming

fewer in process of time, until the panelling had no horizontal divisions at all, but extended first from under the group of windows near the summit of the tower to the ground; and finally from the summit itself to the ground, including even the highest group of windows.

#### CHAPTER III.

#### INTRODUCTION OF BUTTRESSES INTO TOWERS.

THERE are towers which did not assume panel decorations when the gallery-arcades were dropt, but were ornamented by string-courses or corbel tables, with the addition of buttresses. A few, however, even of late times possess neither buttresses, nor any other continuous vertical members, the horizontal members being retained to the last, although occurring less frequently than in the earlier towers.

In a few instances also the buttresses have been added to towers, which are otherwise decorated like those of Chapter I. or Chapter II.

The tower of the Duomo at Siena has buttresspilasters, though incomplete, as they spring out of the basement story; the string-courses, which divide the tower into stories, crossing over the buttresses. This is an interesting example, on account of the arrangement of the windows, the apertures of the groups diminishing in number from six to one inclusive, as we descend from story to story.

The octagonal tower of S. Francesco, Gubbio, also has buttress-pilasters set against each angle, over which the string-courses are carried. Then, again, S. Francesco, Urbino, drawn in fig. 5, Plate XIII., and S. Francesco, Bologna, are other examples, decorated with both horizontal and vertical members, the former crossing the latter. Likewise the well-known Giotto's tower at Florence is an instance in point. In the tower of S. Andrea, Mantua, also, we have string-courses crossing over the buttress-pilasters, though the stories are fewer in number than in the above examples. In the towers of the Duomo at Parma, and that at Cremona, judging from drawings, the stringcourses would seem to cross the buttresses only in a few instances. And in the Duomo at Genoa the buttresses extend from the ground to the summit without any interruption, the string-courses lying between them. Finally, in S. Francesco, Ravenna, we have a tower possessing no horizontal members at all, but buttress-pilasters extending from the ground to the highest cornice.

This is but an incomplete description of buttressed towers; and there are probably many other instances which would serve to show several intermediate steps in the development of the vertical members and disappearance of the horizontal. It must, however, suffice for the present, until a greater number of examples has been obtained.

A few towers in comparatively late times, as we have before remarked, were ornamented by string-courses or corbel tables, and windows grouped or single, without the addition of buttresses or even panel ornamentation; as, for example, those of S. Gotardo, Milan; S. Antonio, Padua; S. Michele, Isola di San Michele, Venice; and a few others. In most of these, in fact generally in the later towers, the string-courses are archiolated, that is, made, decoratively speaking, to rest upon little arches such as we see at the heads of the archiolated panels; and in some of the latest towers, as, for example, those of the Palazzo Pubblico at Florence and Siena, the highest cornice is machicolated, a method of ornamentation clearly derived from that of archiolations. In the late towers, however, the horizontal members are in general few and far between, and there is fre184 INTRODUCTION OF BUTTRESSES INTO TOWERS.

quently a very long basement story without any divisions or decorations at all.

From all that has been said, therefore, we perceive that the earliest towers as well as the earliest façades had neither horizontal nor vertical divisions, but were ornamented simply by windows, either in groups or forming single lights; and, just as was the case in the façades, the towers became crossed by corbel tables, and decorated with gallery-arcades, or at least with groups of windows so extended as to produce a somewhat similar effect.

Then, again, panelling became the prevailing ornament in some towers, as in façades; and in others string-courses only were added to the piercings; also some had the addition of buttresses to both these methods of decoration. Whichever mode of ornamentation, however, was adopted, changes took place in the relative prominence of the vertical and horizontal members, similar to those in the façade decorations, tending to develope in strength the former, to the weakening and final extinction of the latter.

#### CHAPTER IV.

#### CLASSIFICATION OF TOWERS.

We have seen that there is a very great similarity between the phases of tower decorations and those of façades; hence the divisions and subdivisions in the following classification will have in many respects the same distinguishing points as those of Chapter V., Part II. Thus, we may separate the tower decorations into three principal varieties, A, B, C, with the addition of a fourth, BC, which forms a composite style, partaking of the nature of both B and C.

By A we shall note forms of decoration, the earliest of which consist simply in piercings and grouped windows, arranged one above another, to which string-courses and corbel tables were soon added, dividing each tower into a number of stories; the window groups finally taking the form of gallery-arcades, or panel-arcades.

Under B we shall include towers possessing decorations in the form of archiolated panels, and panels of the forms also seen in the façades which were classed under B, Chapter V., Part II.

Under C will be placed towers, chiefly distinguished by their possessing buttresses, or buttresspilasters, without any of the panels which come under B.

And under BC we shall class all towers decorated by panels such as those under B, together with buttresses or buttress-pilasters such as we find in C.

The first three varieties may be subdivided according to the distinct phases which their decorations assumed. Thus, in A we may distinguish three principal subdivisions, which we shall indicate, as in the former classifications, by the small letters of the alphabet:

a, in which the towers are ornamented by simple piercings, or groups of apertures, there being no string-courses.

b, in which the towers are divided into a number of stories by string-courses, or corbel tables, the groups of apertures being in general separated by columns.

c, in which these groups are divided into pairs

by means of rectangular blocks, which break the sets of columns.

In B we may distinguish four principal subdivisions:

a, in which archiolated panels are used together with string-courses and piercings, such as in Ab or Ac.

b, in which the string-courses are dropt, the only horizontal lines which remain arising from the divisions of the panels.

c, in which these divisions become less numerous, there being in general only one, which separates a pierced story from a long panelled basement.

d, in which there are no horizontal divisions at all, the panels extending nearly from the summit to the ground.

In C we may distinguish three principal subdivisions:

a, in which the buttresses are crossed by the horizontal members.

b, in which the horizontal members do not cross the buttresses, but lie between them.

c, in which there are no string-courses or corbel tables at all.

We might subdivide BC, giving it the same

distinguishing points as B and C; but the examples with which we should be able to illustrate its phases are too few to make it requisite. It is to be hoped, however, that at a future time, when the architecture of Italy has been more thoroughly investigated, this classification of towers will be completed, and the varieties more fully subdivided.

#### CHAPTER V.

# PHASES OF TOWER DECORATION VIEWED CHRONOLOGICALLY.

Before concluding the subject of towers, a few remarks should be made concerning the periods to be assigned to the different phases of decoration classified in the last chapter. The towers classed under A date from very early times; and if we conclude under this variety all towers decorated by piercings, and string-courses, or corbel tables only, its period will extend up to the fourteenth or fifteenth century.

To the first subdivision of A, namely Aa, we may assign the sixth and seventh centuries, placing most of the towers mentioned in Chapter I., which belong to the subdivisions b and c, in the eighth and ninth respectively.

The later towers of A are not sufficient in number to enable us to classify them, or to dis-

tinguish in them the phases of ornamentation belonging to different periods; some, indeed, are probably old towers re-decorated during later times, which increases the difficulty. But in general we may place those in which grouped lights occur earlier than those in which there are isolated windows. Also, the archiolated string-courses are later than the plain ones; and the former again depend as to age upon the form of the arches which belong to the archiolations, the towers in which machicolations occur being the latest of all.

The period belonging to B is included between the end of the tenth and the beginning of the fourteenth century, and we may with probable correctness assign to its four divisions, Ba, Bb, Bc, and Bd, the eleventh, twelfth, thirteenth, and fourteenth centuries respectively; at least the subdivisions of B are in an order agreeing with a chronological one, and moreover extend from the beginning to the end of the period assigned to B.

To C we may assign the twelfth, thirteenth, and fourteenth centuries, placing in these periods the three subdivisions, Ca, Cb, and Cc respectively.

It must be admitted that, on account of the difficulty of ascertaining the particular date of each tower, the periods here given have little more ground than surmise; at the same time they will serve to give a general idea of the relative antiquity of the particular phases of tower decorations, since, in order of precedence, the subdivisions are correctly placed, though the limit assigned to their periods cannot be determined with precision until many more examples have been collated.

#### CONCLUSION.

We have now traced the development of Christian Architecture in Italy from the fourth to the fifteenth century inclusive, detailing the principal steps in that development, which at the same time have been illustrated by numerous examples; and finally, we have arranged in order the different phases which were assumed in the decorative and mechanical construction of the interiors, façades, and towers.

It will be admitted that this order is probably a chronologically correct one, if we call to mind how naturally any particular phase of decoration grows out of the one immediately preceding; and, moreover, how we find the very changes which lead us to those phases effected in some particular cases, not by caprice, but for some useful purpose; such as the giving new strength to a building which had become dilapidated by age;

or from some accidental combination arising out of a process of restoration.

Then, again, it is remarkable that with but few exceptions, and these ambiguous ones, the examples are found to be actually in chronological order when we arrange them in accordance with the phases of decorations, which have been classified morphologically; at least so far as this, that priority of time concurs with that of place in the classification.

The conclusion we should arrive at, therefore, is, that Christian Architecture did really develope, not first this way and then that, as if through the capricious ingenuity of individuals, but regularly under the guidance of the universal principle, "That every artifice of the construction must be displayed;" which came into operation gradually, while it undermined the action of the opposite principle, "That every artifice of the construction must be concealed." Hence we cannot conceive with "the Ostrogoths" on the one hand, that Gothic architecture was an Eastern invention imported into Europe, where it suddenly and entirely displaced the Romanesque styles; nor can we, on the other hand, believe with an eminent

architect, however flattering the thought may be to an Englishman, that Gothic architecture was first introduced into Italy from this country, and was afterwards imitated by the Italians in a manner worthy only of contempt. Nor can we agree with the assertion which has been frequently made, that although in England we are able to distinguish the styles of architecture, and name them according to periods of time, on the south side of the Alps the confusion of styles is so great that it would be hopeless to reduce them to any thing like order.

It will perhaps be said that a view equally extreme with any of the above has been taken here, and that we have made Italy alone the centre of all progress in Christian Architecture. We must explain, therefore, that although the early Basilican churches of Rome have been considered as the nucleus out of which subsequent Christian Architecture expanded, yet it has been no where asserted that in after ages no step was taken in other countries towards the perfection of architecture without following in the footsteps of the Italian architects.

On the contrary, we have supposed that archi-

tecture developed in each country to a great extent independently, although not altogether without some mutual influences from whose operation Italy itself cannot claim exemption. If we were to attempt a treatment of the Architectures of France, Spain, Germany, or England, similar to that which has been adopted here of Italian Architecture, we should probably find like steps in their development, and phases determined by changes which were the products of accidental combinations, corresponding with those we have pointed out in the preceding pages; only with certain minor differences, whose effect was not to warp the direction of Architectural progress under the action of the fundamental principle, but simply to constitute those varieties which we have called local. It is conceived, therefore, that the minds of all architects in different places and at different epochs, were subject to a general law which they, perhaps unconsciously, obeyed while they exerted the freedom of their wills and the ingenuity of their intellects; and that, notwithstanding this law, the peculiarities of different races, or of the peoples of different countries, showed themselves in certain effects discernible in their architectural productions; and further, that even provinces and cities possess buildings with features purely local; and still further, that the character of the individual architect has been to some extent impressed upon his works. And yet, while we discern these peculiarities, we can at the same time perceive the mutual influences of country upon country, province upon province, city upon city, and even of particular buildings upon others.

Among the influences of country upon country, the introduction of the pointed arch is said to be one; and it is a common opinion that it was brought from the East during the twelfth or thirteenth century. This cannot, however, be admitted, since, as has been already said, this form of arch is found among the Etruscan ruins, and, moreover, it probably existed here and there even in Christian churches considerably earlier than the twelfth century. It is true, however, that its eastern luxuriance began before it became generally introduced into Italy; therefore, we may consider that Italy, as well as other countries of the West, followed the example set in the East.

It is hardly necessary to remark that it is still more difficult to agree with the statement made at page 767 of Mr. Fergusson's Illustrated Handbook of Architecture, that "one of the earliest, or perhaps the very first Italian edifice into which the pointed arch was introduced, is the fine church of S. Andrea at Vercelli."

Nothing has as yet been said in this work of Italian Architecture viewed æsthetically. It will perhaps, therefore, not be out of place to offer here a few remarks on this branch of the subject.

It is curious to observe the different views taken respecting the relative merits of the different architectural styles, particularly at this time when the question has been so much debated. It would seem that some persons are able to appreciate that style only which manifests completely some one distinct principle; as, for instance, the Classical architecture of Greece in its purest form, or the Gothic in its most perfect phase. Again, a great many persons find most satisfaction in architecture at that stage of progress in which the opposite principles of the Gothic and Classic styles exhibit

a nearly equal degree of ascendency, such as is the case in buildings of the tenth and eleventh centuries.

So many, indeed, are the differences of opinion on architecture asthetically considered, that it may be asserted, without fear of contradiction, that there are as yet no universally received principles of architectural excellence which would exclude any style from a fair degree of admiration.

We must, therefore, take a more liberal view than any of the above, and admire architecture in every one of its phases, until some reason has been shown why one mode of decoration is better than another, or why one set of rules for determining the relative proportions of the various parts of a building should alone be followed.

Where, however, the mechanical construction of a building has been attempted to be displayed decoratively, but in a manner not in accordance with the science of mechanics, as regards the positions of the members, or in respect of the relative proportions of the different members considered with reference to the weights which they either apparently or really support, or the lateral and diagonal thrusts which they are intended to counteract, then we cannot consider that the architect has been successful.

As the principle of Gothic has not yet been completely carried out; and as in England this is the style most generally adopted, something should be said here with reference to the architecture of the future.

An architect, in order to succeed in constructing a Gothic building, should be thoroughly and correctly acquainted, even to the minutest extent, with the mechanical theory of his structure; and the more completely Gothic he wishes it to be, the more fully should he display this theory. We may suppose that a much higher degree of perfection would be arrived at in Gothic architecture, had we architects thoroughly acquainted with mechanics considered mathematically.

There is no limit to the variety of beautiful styles which might yet arise if the Gothic principle were fully carried out in the minutest details.

We might suggest, therefore, that in designing a building, the various requirements of the structure should first of all be attended to exclusively with reference to its practical application. These should be strictly carried out without any deviations

arising from a prejudice for a particular rule of proportion, or for the sake of a supposed beauty of The building having thus been conceived of as to its mechanical construction, it will then remain to display this construction decoratively with mathematical correctness; and the result will be more or less perfect, according as the architect has correctly or not solved the mechanical problem; the beauty of the structure being greater, the deeper his perception has been of the mechanical construction, even to its minutest details. Thus the problem of building is not unlike that which the sculptor solves; for he has to carve his statue in accordance with the science of anatomy; and he does this most perfectly when he has succeeded in displaying even in the smallest particulars the internal structure of the body.

Let, therefore, the architects of the present day look less behind them. Let them simply learn from the past those principles which are to be followed in the future. Let them also have a strictly liberal education, and, above all, a sound knowledge of Statics, in order that they may be able to carry out correctly and fully in their decorations the mechanical construction of their designs.

As it is at present, architects, and too frequently general writers on architecture, form their notions of excellence on views of their own, which are often little more than prejudices. venture on criticisms, while they have no other modulus than that which they themselves have created, and which has been determined to a great extent by their education, and the accident of Thus Mr. Fergusson, in his Handbook, says of S. Antonio at Padua, "A signal failure was the result; for an uglier church can hardly be found any where;" and of S. Petronio, Bologna, "It is fortunate that it stopped there, as no uglier building was ever designed or executed." remarks can only be of value, as showing to how great an extent the standard of beauty, set up by particular individuals, is subject to sympathies, which are the result of a particular menta training.

It is certainly true that a person accustomed only to that special and beautiful Gothic, of which this country possesses so many noble examples, would at first feel disappointment on beholding S. Petronio, S. Antonio, or any other Italian church. In them he would in vain look for that

picturesque multiplicity of parts, and strong contrasts of light and shade, produced by the congeries of mouldings and profusion of tracery with which the northern Gothic abounds. He would, perhaps, consider as bald the large uncut planes, ornamented by surface decorations only, such as mosaics or frescoes. Then, again, the immense span of the pier-arches, and also their height relatively to that of the partition walls, leaving no room for a triforium, or even a proper clerestory; the great breadth of the aisles themselves compared with their length; the absence of large windows for the display of tracery, and the stiff foliage of the capitals, too vividly calling to remembrance the Classical types; all these features, which are characteristic of Italian architecture, can hardly fail to create disappointment at first. But what seems most extraordinary is, that English architects should so hastily criticize these buildings, forgetful that their own conceptions of the beautiful are thereby exposed to the danger of censure; and it is still more strange that some should even assert of Italian Gothic, that it is an imitation, but a most contemptible one, of the northern Gothic. Surely, we cannot suppose that

men of undoubtedly great minds, many of them universally acknowledged as having excelled in painting and sculpture, could have produced buildings, and these, too, almost unmatched in size, differing so entirely and so systematically in many respects from those of the northern Gothic, if they were all the while attempting Is it not more reasonable to imitate them. to conclude that those peculiarities, which have been by some so readily styled faults, were in fact the results of a perception of beauty in the architects different from ours, but not the less true? Can we not conceive that architectural excellence may lie equally in the boldness produced by simplicity of ornament, as in the variedness consequent upon the multiplicity Is the mystery of the northern Gothic, by which the mind is kept in a state of unsatisfied curiosity, alone to be sought after, while the repose resulting from a complete comprehension of the design is to have no claim upon our regard?

In fine, must we not admit that, as in individuals, excellence may exist as well in one combination of mental qualities as in another; so,

also, it may be found in different architectural productions, which are the lasting impressions of the collective minds of the age and country to which they belong?

We can hardly expect that men who so easily constitute themselves critics of works displaying a costliness and magnificence to which modern times have produced as yet no parallel, will do much towards the progress of architecture in this country; we must look to those, rather, who will submit to learn something even from buildings which do not come up to their own standard of excellence, and who, at all events, do not constitute themselves publicly the absolute judges of matters of taste which have never yet been reduced to rule.

## APPENDIX.

#### VAULTING.

#### CHAPTER I.

CYLINDRICAL SURFACES.

Section I. Introductory Remarks.

It has been considered that a short treatise on vaulting would be a valuable appendage to this work, particularly as the methods of vaulting in Italy are sufficiently numerous and ingenious to make it a subject of considerable interest and utility; and since it has as yet received only a very partial notice in other works on Italian architecture, and that in a way requiring elaborate drawings in perspective as a means of enabling us to understand the descriptions with which they are accompanied.

In the present treatise a method of notation, introduced by the Author of the "Architectural

Notes on German Churches," has been adopted, with such alterations and additional notations as the peculiarities of Italian vaulting require.

The surfaces constituting the vaulting will be considered as to their forms alone, no regard being paid to thickness; and methods of generating these surfaces will be first of all examined, in order that by merely glancing at the notation, we may be able at once to conceive a correct image of the form of the vaulting without the aid of drawings in perspective at all.

In the present day it is particularly necessary that the subject of vaulting be brought prominently forward, as it has been and is still very much neglected in this country. This want of attention to vaulting must be considered as a great misfortune, on account of the important place it holds in the mechanical construction of a building; for we have seen in the preceding pages that it greatly contributed to effect in the other members those changes which were the signs of vitality in the science of architecture; and that it was mainly the adding of new vertical members to the piers for the support of the vault which caused the continuous horizontal members to disappear, so

that architecture became developed into what is termed the Gothic style.

In Plates XIV., XV., and XVI., nearly all the varieties of Italian vaulting have been noted; and we shall find that these notations will enable any one to obtain, without much effort, clear ideas of the forms in space which are indicated, after the following short description of the surfaces has been attended to, and the meaning of the notations explained.

#### Section II. Cylindrical Surfaces.

The surfaces employed in vaulting are either parts of cylinders, or of oblique cones, or certain other surfaces which cannot be generated by straight lines, and which we shall hereafter describe.

¹ It may be advisable for those who have not had the subject of the generation of surfaces brought before them, to give a short explanation of the method and terms employed. Any surface may be traced out in space by a line, curved or straight, provided the motion of the line be properly directed. The moving line is called the *generator*, and one method of directing its course is to compel it always to intersect a fixed line, together with certain other conditions, as, for example,

In the cylindrical surfaces, two kinds of directrices are used, namely, an arc of a circle, or two equal arcs intersecting in one extremity so as to make an acute angle, their concavities being turned towards each other.

A directrix is placed in a vertical plane parallel to a side of the compartment which is to be vaulted, its altitude 2 being in a vertical position.

that in every position it shall make a given angle with the fixed line: the fixed line is called the directrix.

As an example, suppose we place a pencil with its point on a piece of flat paper, and let the point trace a circle on the paper, to which the pencil always remains perpendicular; then we shall find that the pencil itself will trace out a cylinder. In this case, the pencil is the *generator*, and the circle is the directrix; also the condition has been given that, as the pencil moves, it shall always remain perpendicular to the paper.

Again, if a circular ring be made to slide along a pencil upon which it is suspended, the pencil being kept horizontal; the ring will trace out a cylinder. In this case, the ring is the generator, and the pencil is the directrix; and the conditions are that the pencil be kept horizontal, the ring being made to slide so as always to lie in a plane parallel to the one in which it was at first placed.

<sup>2</sup> The line joining the extremities of the arc or the free

In general, the base of the directrix, or the base produced, passes through the centre or centres of the circles whose arcs form the directrix; when this is not the case, it will be expressly mentioned.

Each surface is generated by a straight line moving so as always to remain horizontal, its course being directed by obliging it to intersect the directrix.

That line, parallel to the generator, which passes through the point of intersection of the base and altitude of the directrix, will be called the axis of the surface.

The vaulting is constructed of one or more of these surfaces; when two or more are used in covering a compartment, it is to be understood, when not stated otherwise, that those lines, which coincide with the highest positions of the generators (that is, when they pass through the vertices of the directrices), intersect in one point. It must be remarked also, that the surfaces generated do not extend below the lines of their intersection.

The surfaces, whose axes are parallel to the

extremities of the arcs forming the directrix will be called the base; and a line dropped from the vertex perpendicular to the base, the altitude.

axis of the aisle, the vaulting of which we may happen to be considering, will be called *longitu*dinal, and those whose axes are in a direction perpendicular to this, transverse; and those whose axes lie in directions differing from either of these, oblique.

Of the cylindrical surfaces, we shall call those simple and compound, whose directrices are constructed of one or two arcs respectively.

# Section III. Division of the Aisles into . Compartments.

The aisles, whether their plans be rectilinear, or curvilinear, are frequently divided by transverse arches into a series of compartments, the arches springing from every pier, or from every second or third pier; these will be called *primary compartments*.

A primary compartment is covered by a longitudinal surface, and this is frequently intersected by transverse, and also in some cases oblique surfaces, arranged in sets, in each of which the axes intersect in one point, the transverse and oblique surfaces not intersecting those of a neighbouring set. Each of these sets covers a space, which will be called a secondary compartment.

The secondary compartments have their vaults divided into parts by the lines of intersection of the surfaces; these parts cover spaces, which will be termed tertiary compartments.

The vertical line, passing through the point in which the axes of the surfaces which cover a secondary compartment intersect, will be called the vertical axis of the compartment.

It is evident that the lines of intersection, which indicate the boundaries of the tertiary compartments, will themselves meet in a point situated in the vertical axis; this point will be called the vertex of the compartment.

The longitude and latitude of a secondary compartment will be spoken of, these terms signifying horizontal linear measurements through the vertical axis in directions parallel and perpendicular respectively to the axis of the aisle which contains the compartment.

## Section IV. The Notation of Vaulting by Cylindrical Surfaces.

The notation which has been adopted for indicating the kinds of vaulting by cylindrical surfaces is as follows:—

Having drawn the plan of a secondary compartment, we must draw lines indicating its division into tertiary compartments; this has been done, for example, in fig. 9, Plate XIV. It will be noticed that, in each of the triangles composing the figure, small arcs are placed with their convexities turned towards each other; these indicate that both the longitudinal and transverse surfaces are simple. In fig. 10, instead of arcs, there are two straight lines drawn parallel to the boundaries of the tertiary compartments in each triangle, meeting in a point; these signify that both the longitudinal and transverse surfaces are compound.

The kinds of vaulting by means of cylindrical surfaces we will now briefly state:

Case 1. In which we find a longitudinal surface only, as in figs. 1 and 2, Plate XIV., where the surfaces are respectively simple and compound.

Case 2. In which the longitudinal surface is intersected by transverse surfaces, having the altitudes of their directrices less than that of the longitudinal surface; see figs. 3, 4, 5, and 6, Plate XIV. In figs. 3 and 5 the longitudinal surface is simple; in figs. 4 and 6, compound.

Case 3. In which the altitudes of the directrices

of the transverse surfaces are the same as that of the longitudinal one; see figs. 9, 10, 19, 20, and 21, Plate XIV. In fig. 9 we see that both surfaces are simple; in fig. 10 both are compound. The same is true of figs. 19 and 20 respectively, the compartments having a greater longitude 3 than latitude.

In vaulting, such as that of fig. 19, we find sometimes that the directrix of the transverse surface is a semicircle, that of the longitudinal one being a stilted semicircle; but more commonly the longitudinal surface has a semicircular directrix, and the transverse one a directrix formed of an arc less than a semicircle. Fig. 21 is an instance in which the longitudinal surface is compound, the transverse one being simple.

Case 4. In which there is no transverse surface, but only oblique surfaces intersecting the longitudinal one; see fig. 12, Plate XIV., where all the surfaces are compound.

<sup>&</sup>lt;sup>3</sup> For convenience' sake we have named the direction across the Plate longitudinal, and that up or down the Plate transverse. It is not necessary to suppose that these directions always agree with those of the aisle whose vaulting we may be considering.

When oblique surfaces are used to vault rectangular compartments, their directrices are placed in transverse or longitudinal planes, and as their axes lie obliquely, the generators are not perpendicular to the planes of the directrices. In the vaulting of fig. 12 the axes of these surfaces lie more nearly in a transverse than in a longitudinal direction; hence we may call them transverse-oblique. In fig. 11 the oblique surfaces extend only half way across the secondary compartment, and in the other half the longitudinal surface is intersected by a transverse one.

Case 5. In which all the surfaces are oblique; see fig. 13. Here the two new oblique surfaces, which take the place of the longitudinal one, may be called *longitudinal-oblique*.

Case 6. In which all the four kinds of the surfaces before mentioned are used together; see fig. 15.

In figs. 16 and 42, Plate XIV., also in figs. 3, 6, 7, and 8, Plate XV., we have examples in which other compartments than rectangular are vaulted. In these examples the directrices of the oblique surfaces are placed parallel to the exterior sides of the tertiary compartments; and in most of them, the lines representing the exterior sides

of the tertiary compartments form a part of a regular figure, inscribed in a circle with its centre in the vertical axis of the secondary compartment. Hence the axes of the surfaces, and consequently the generators also, are perpendicular to the planes of the directrices.

In some instances the lines coinciding with the highest positions of the generators are ribbed, as in fig. 14, which otherwise is the same as the vaulting of Case 3.

Sometimes the lines of intersection of the surfaces are cut away, so that the boundaries of the tertiary compartments are undefined, the secondary compartment thus becoming vaulted by a continuous surface intersecting its sides, in curves similar in form to the simple or compound directrices; see figs. 17 and 18, Plate XIV.

#### CHAPTER II.

VAULTING BY DOMICAL SURFACES.

Section I. Generation of Surfaces.

THESE surfaces will be supposed to be generated by arcs of circles, or two intersecting arcs; in other words, the generators are constructed exactly like the directrices of the cylindrical surfaces. The directrices also of the domical surfaces are constructed similarly to the generators, and the terms simple and compound will be used in speaking of both, when we wish to express that they are constructed of one or two arcs respectively.

In vaulting a secondary compartment, the directrices, their altitudes coinciding, will be placed in vertical planes, and in such a manner that they indicate the boundaries of the tertiary compartments, each of which is covered in the following way.

The plane of the generator is made to move

parallel to the exterior side of the tertiary compartment, the generator having its altitude vertical, and being always obliged to intersect the two directrices. In its first position it is placed so that the extremities of its base coincide with those of the bases of the directrices; when its altitude is in the same line with the vertical axis of the compartment, its vertex coincides with the point of intersection of the directrices. It is then supposed to continue its motion so as to generate a like surface over the opposite tertiary compartment, its final position being similar to the first as regards the points of its intersection with the directrices.

According to this method, the surface generated will extend below the directrices; we must suppose, however, these parts to be cut away, thus making the directrices the bounding lines of the surface.

It is evident that we might have generated the cylindrical surfaces of Chapter I. in this manner, if we had made the condition, that the altitudes of the generator and directrices should be the same.

In the domical surfaces, the altitude of the generator is always less than that of the direc-

trices; on this account the base of the generator will not move in a horizontal plane; we shall, therefore, term the axis of the surface that horizontal straight line which passes through the intersection of the base and altitude of the generator in its first and last position.

### Section II. Notation of Domical Surfaces.

We shall have, in framing a notation for the domical vaulting, to indicate the form of both the generator and the directrices, and also the difference in their altitudes.

Fig. 26, Plate XIV., is the notation of a compartment vaulted by a transverse and longitudinal surface, the diagonals indicating the positions of the bases of the directrices.

The circle, described round the intersection of the diagonals as centre, indicates two things; firstly, that the directrices are simple; secondly, that the altitudes of the generators are equal in both surfaces, and less than that of the directrices.

In fig. 29, instead of a circle, a square has been drawn by lines joining points in the boundaries of the tertiary compartments; this indicates, as before, that the altitudes of the generators are equal to each other, and less than that of the directrices, but, also, that the directrices are compound.

The other parts of the notation indicate whether the generators are simple or compound, as in the cases of Chapter I.

In figs. 30 and 31, arcs of circles, with their convexities turned towards each other, are drawn in the compartments of the longitudinal surface; these indicate that this surface alone has the altitude of its generator less than that of the directrices, the directrices also being simple. In fig. 36, the arcs are replaced by straight lines showing that the directrices are compound.

In figs. 32 and 33, Plate XIV., the difference in the radii of the arcs shows that the difference between the altitude of the generator and that of the directrices is greater in the surface to which the greater arcs refer than in that to which the lesser arcs have reference.

Similar differences may also be indicated in those instances in which the directrices are compound, by differences of length in the straight lines which refer to the directrices.

In domical vaulting we find similar combinations of longitudinal, transverse, and oblique surfaces, as in the cases from 3 to 6 inclusive, of Chapter I.; and these four cases produce a great number of varieties which depend upon the forms of the directrices, and upon the differences between their altitudes and those of the generators.

In figs. 24 and 25, it will be noticed that the transverse surface has, in one tertiary compartment, the altitude of its generator less than that of the directrices, but in the opposite one they are equal; also, that in the one, the surface is compound, and in the other, simple.

In figs. 22 and 23, the boundaries of the tertiary compartments are undefined, the lines of intersection of the surfaces having been, so to say, cut away.

In figs. 38 and 39, the boundaries of the tertiary compartments are visible to a partial extent only.

In fig. 37 there are no marks to indicate the nature of the generator of the longitudinal surface; when this is the case, it is meant to be understood that the generator is a straight line. This case

reduces itself, therefore, to one in which there is only a transverse surface, the diagonals indicating ribs instead of lines of intersection.

Figs. 7 and 8, Plate XIV., represent vaulting in which there is a longitudinal surface intersected by transverse ones to a partial extent, in a manner similar to the vaulting of figs. 3 and 4, the oblique lines indicating ribs lying on the longitudinal surface.

Most of the remaining figs. of Plates XIV. and XV. represent methods of vaulting apses, and of constructing certain domes, the nature of which is sufficiently evident without further remark.

#### CHAPTER III.

#### EXTRAORDINARY METHODS OF VAULTING.

We have now considered the ordinary methods of vaulting; we will, therefore, proceed to discuss cases which require vaulting of a much more complicated construction.

Case 1. Fig. 8, Plate XVI., is the notation of a compartment in the transept of the Duomo at Narni. The compartment is covered by a longitudinal simple surface; and this is intersected by three others, the central one of which has a variable generator; the notation, therefore, indicates the forms which the generator assumes in its first and last positions.

We will suppose the generator in its first position to be compound, the centres of the circles, out of whose arcs it is formed, lying below its base, as in fig. 11. As the generator moves from its first to its last position, we must suppose the centres of the circles, E and F, to

move at a uniform rate in the straight lines EG and FB to O, the point of intersection of the altitude AO and the base CD, the altitude remaining constant, and the variable quantities being the length of the base, and the radius of the circles. It will be seen that the generator will then assume the form of a semicircle in its last position.

If, therefore, R denote the radius BF or EG at any position of the generator; L, the length of the line CO, that is, half the base; a, the altitude AO; and 2a the angle EOF; we shall find that the equation

a  $\cos a + \sqrt{R^2 - L^2 \cos^2 a} = L \sin a + \sqrt{R^2 - a^2 \sin^2 a}$ will give us the relation between R and L.

Case 2. Fig. 2, Plate XVI., is the notation of the vaulting in the ambulatory of S. Giovanni in Laterano, Rome. In this case each of the two aisles of which it is composed is covered by a surface, generated by means of a semicircle fixed in a vertical plane, which is made to revolve about the vertical axis of the apse, round which the ambulatory is carried. This surface is intersected by transverse surfaces generated as follows: The generator is an arc of a circle, which varies in

224 EXTRAORDINARY METHODS OF VAULTING.

length, becoming a semicircle when its base is shortest.

We will suppose its first position to be that in which its base is longest. In this position the centre of the circle lies below the base in the altitude produced, and as the generator moves, we must suppose the centre of the circle to move in the line of the altitude up to the point of its intersection with the base. It is evident that the relation between the two variables R and L may be determined by putting a=a in the equation of Case 1, which gives us the equation

$$L = \sqrt{2aR - a^2}.$$

Case 3. Fig. 41, Plate XIV., is the notation of part of the vaulting in the Duomo at Siena. In this case the longitudinal surface is simple, being cut obliquely at one end; but the transverse surface is generated as follows:

We will take the first position of the generator to be that in which it assumes a compound form. The centres of the circles, out of whose arcs the generator is formed, lie in the base, or base produced. As the generator moves from its first to its last position, we must suppose the centres of the circles to move in the base up to the point of intersection of the base and altitude. Thus we shall get the relation between the variables R and L by putting  $a = \frac{\pi}{3}$  in the equation of Case 1, which gives us the following equation:

$$L = R - \sqrt{R^2 - a^2}.$$

Case 4. In S. Vitale, Ravenna, we find the side aisle with very curious vaulting.

In fig. 1, Plate XVI., one primary compartment of this vaulting has been drawn. The longitudinal surface is generated by a semicircle, varying in radius, and for the most part stilted. The generator lies in a vertical plane, which is made to revolve round the vertical axis of the central part of the church. When its base is longest it assumes the form of a semicircle; in any other position its form is that of a semicircle stilted, the stilts being arcs of circles, whose radius may be taken to be equal to the altitude of These arcs have their convexities the generator. turned towards each other, and form with the semicircle a continuous curve; see fig. 12, Plate XVI. If we suppose the altitude AO to be, a; the length of half the base of the generator, BO, to be, L; and the radius EG of the semicircle to be, R; in 226 EXTRAORDINARY METHODS OF VAULTING.

any position of the generator; we shall find the following relation between the variables L and R:

$$L = R + a - \sqrt{2aR - R^2}.$$

The transverse surfaces in this Case are generated similarly to those of Case 2 of this Chapter.

Besides the above Cases, there are a few other modes of vaulting which require a short notice.

Fig. 7, Plate XVI., is the notation of the vaulting of the aisle in the Duomo vecchio at Brescia. The longitudinal surface is crossed by transverse arches in such a manner as to permit the transverse surfaces to have constant generators like those of Case 3, Chapter I.

In fig. 3, Plate XVI., is represented the vaulting of the crypt of the Duomo at Vicenza.

The vaulting is supported on four columns standing at the angles of a compartment square in plan, which is vaulted according to the method of Case 3, Chapter I. Between this compartment and the external curved wall, the space is covered by a surface generated by means of a semicircle

<sup>&</sup>lt;sup>1</sup> We indicate arches by straight lines with an x or a  $\times$ , according as they are round or pointed respectively.

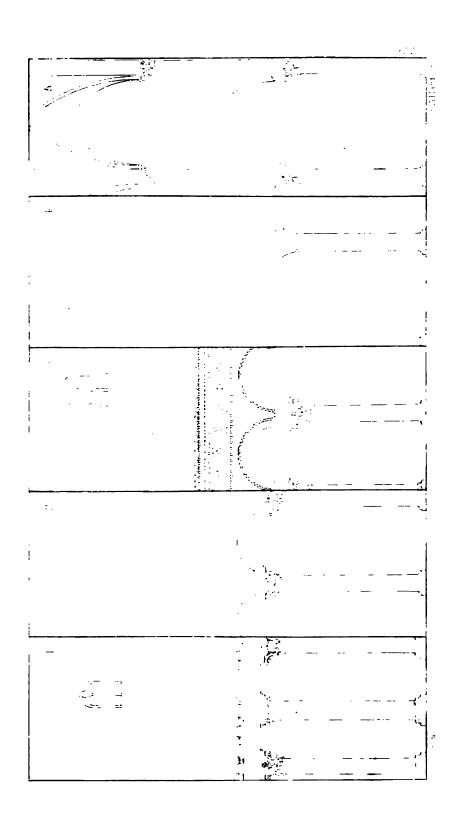
whose plane revolves round the vertical axis of the above-mentioned compartment.

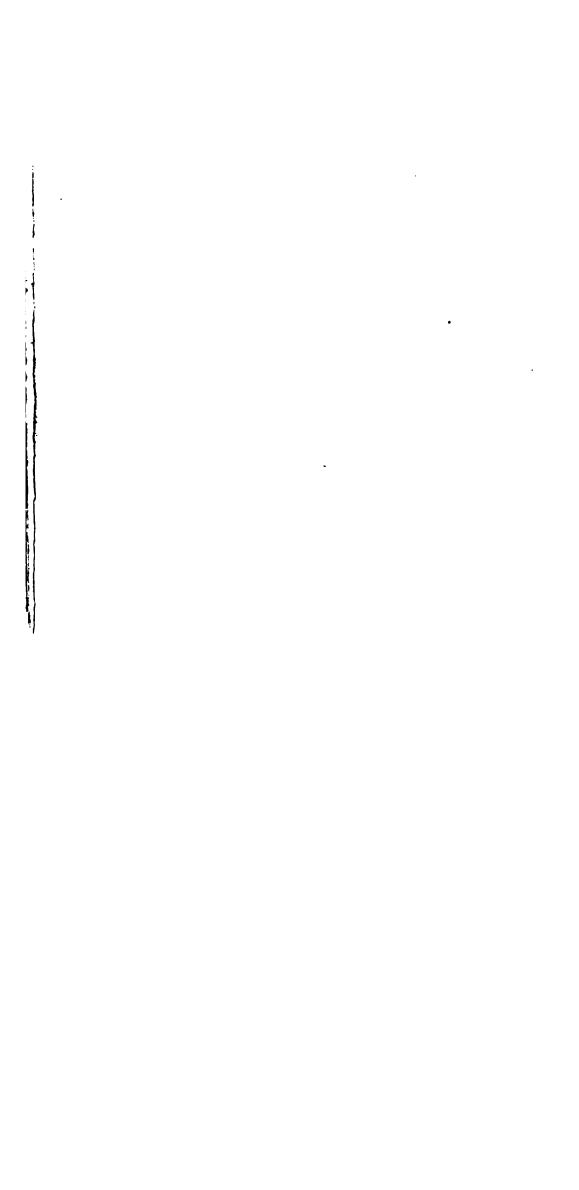
The transverse surfaces are generated similarly to those of Case 3 of this Chapter.

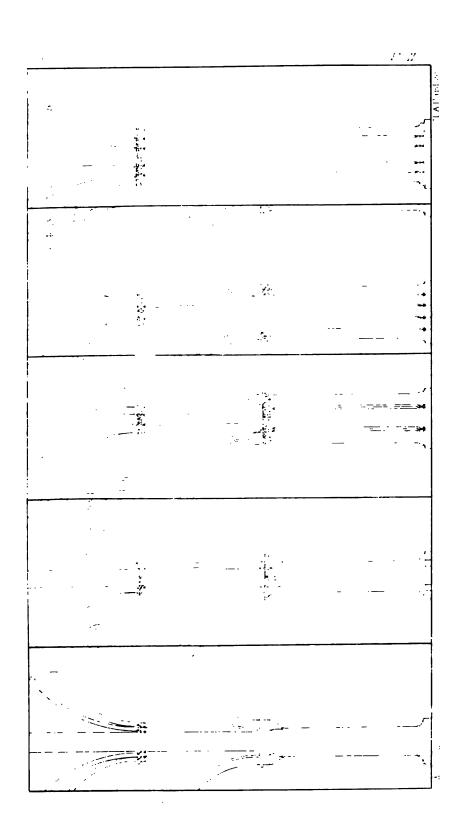
Fig. 6, Plate XVI., shows us a part of the vaulting in the crypt of S. Ambrogio, Milan. The compartments bounded by the external wall are vaulted similarly to those of Case 3 of this Chapter. The interior compartment, whose plan is an irregular quadrilateral, has both its surfaces generated similarly to those of Case 3, they being cut obliquely by the sides opposite to the right angle.

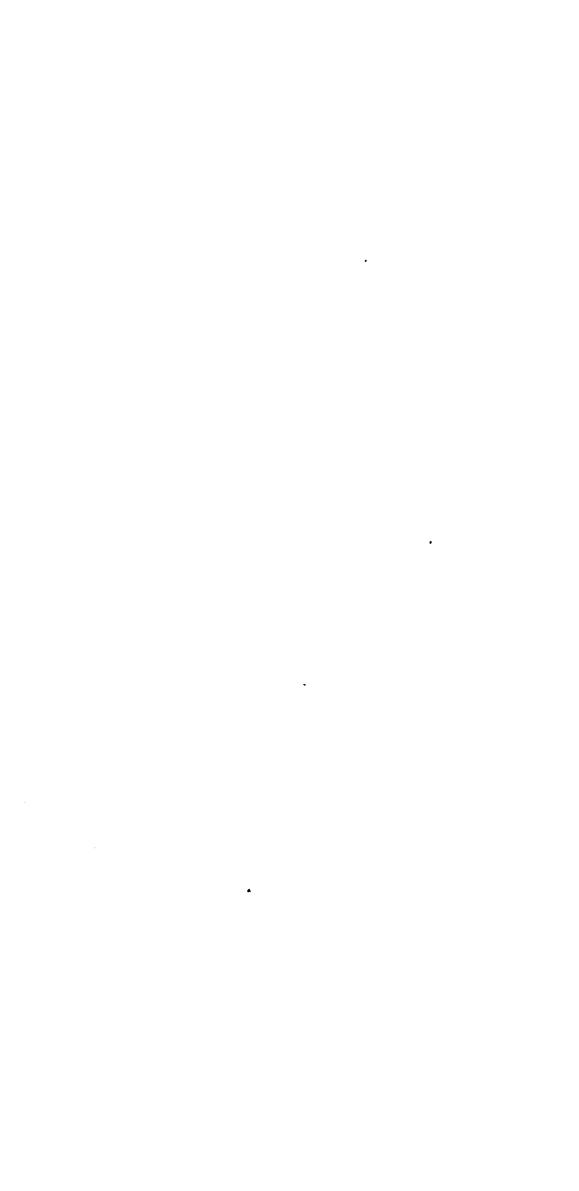
Fig. 10, Plate XVI., represents the vaulting of the double side aisles of the Coro in the Duomo at Pisa. The two aisles are covered by one vault, with a longitudinal surface and transverse surfaces after the manner of Case 3, Chapter I., the secondary compartments being square in plan. The division between the aisles is effected by means of longitudinal arches placed under the transverse surfaces, with which they are concentric, so as to divide them into equal parts.

Fig. 13 represents the method of vaulting the aisle of the chevet in most Gothic churches. In

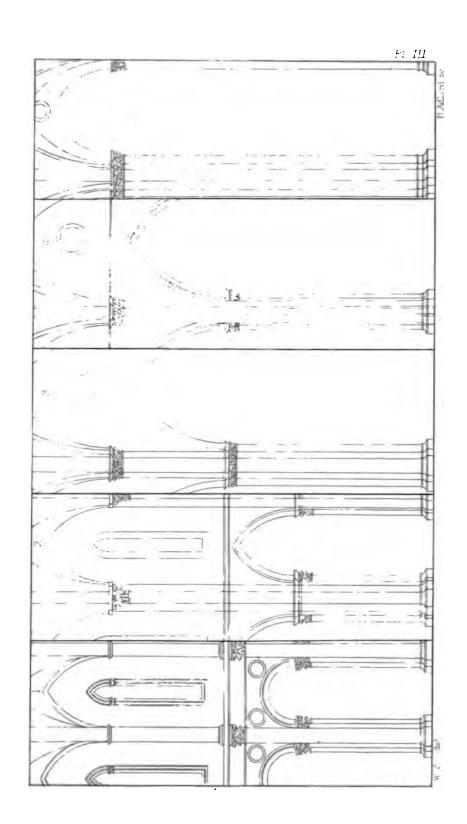


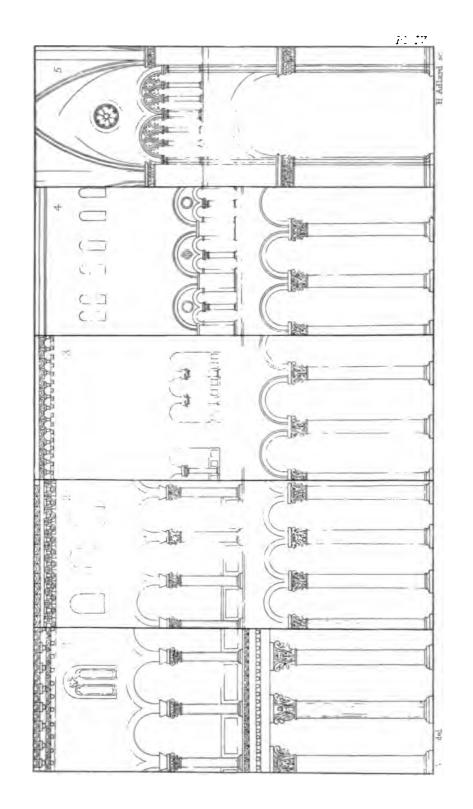




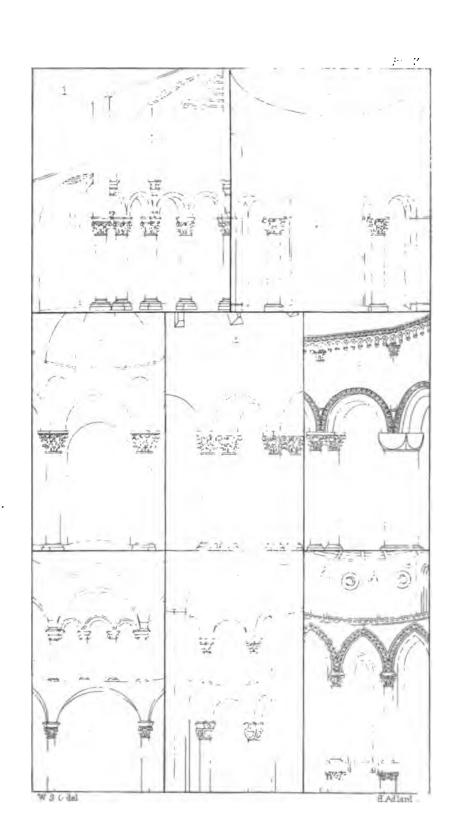


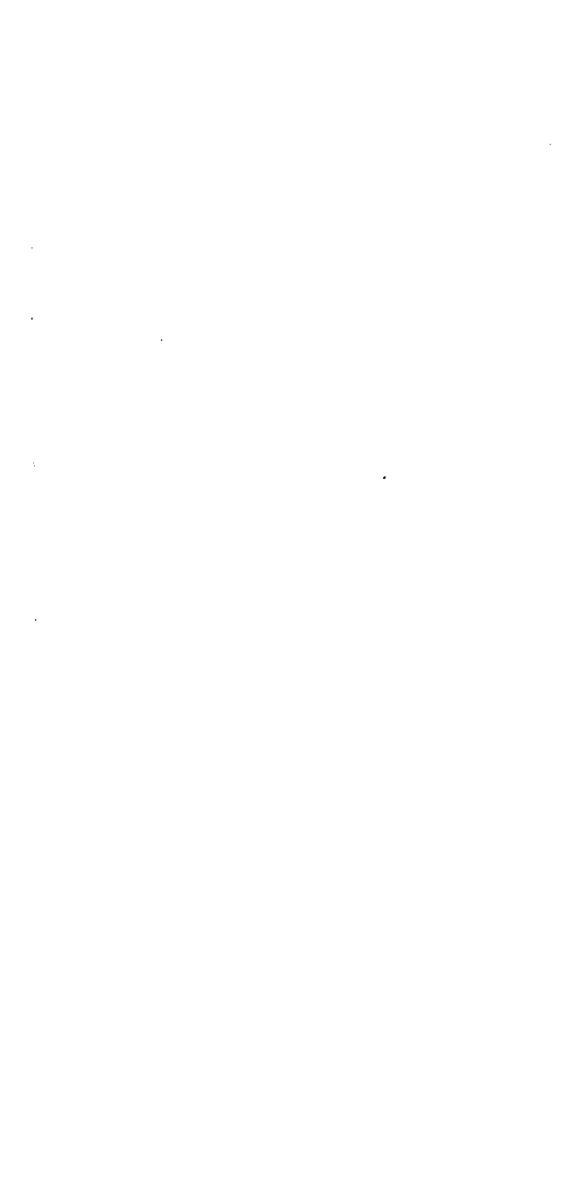


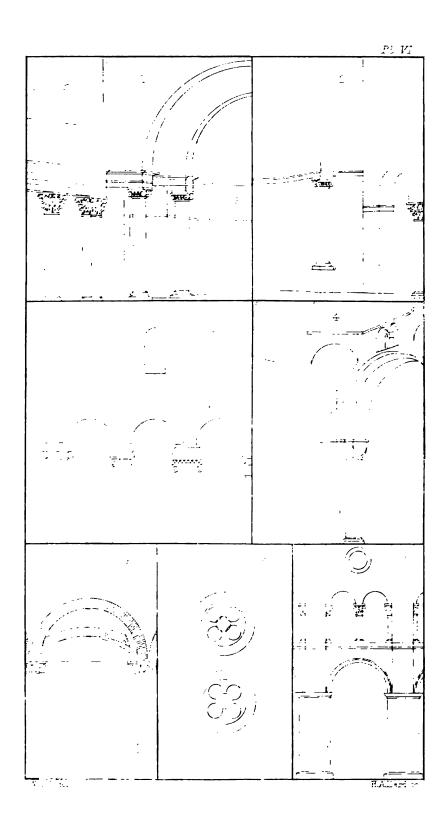




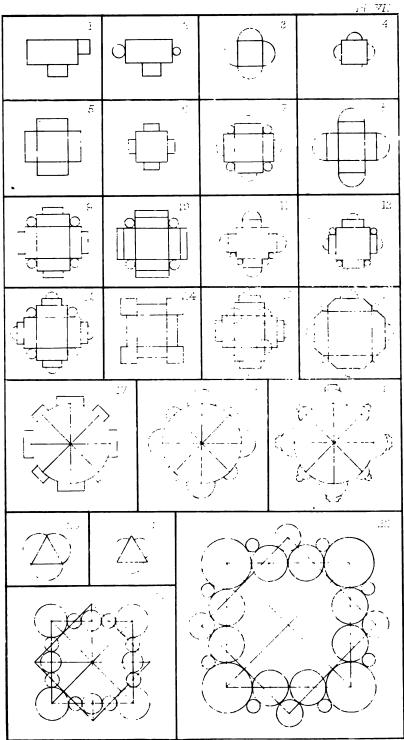












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